



The viable system model and the Viplan software

The viable system model

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Abstract *The software Viplan learning system is an aid to learn about Beer's viable system model (VSM) and its application. This is done with the support of the Viplan method. The five activities of this method are explained with examples. First, it offers an approach to understand and discuss organisational identity through analysis of stakeholders. Second, it describes structural modelling of activities, which is followed by the crucial idea in the method of unfolding the organisation's complexity. Fourth, it shows a tool for studying the distribution of resources and discretion in an organisation. Fifth, and finally, it offers a form of relating these resources to the VSM, thus allowing the development of diagnostic points. The paper ends with a short description of the software itself.*

Introduction

This paper offers an introduction to the Viplan learning system software (Syncho Ltd, 1996). The paper assumes that the reader is familiar with the viable system model (VSM) (Beer, 1979; 1981; 1985) as a tool to model an organisation's structure. The purpose of the software is to support the application of the VSM to all kinds of organisations. The VSM has often been regarded as a powerful modelling tool, but as one that is difficult to use in practice. The Viplan method (Espejo, 1989) has been developed over years of application of the VSM in many organisations large and small, in the public and private sectors. It is this method that the Viplan learning system explains and describes.

The method is used in two modes. Mode I studies an existing organisation and its purpose is diagnostic; Mode II is a design instrument for an enterprise that is in the process of being established or is undergoing a fundamental change in identity (i.e. for a "new" organisation). Often modellers begin with a study in a diagnostic mode, discover issues of concern, and then move into a design mode in order to model potential structural improvements. In this sense Viplan is a tool to support organisational problem solving.

The steps of the method are as follows:

- Establishing organisational identity.
- Modelling structural activities.
- Unfolding of complexity: modelling structural levels.
- Modelling distribution of discretion.
- Modelling the organisational structure: study, diagnosis and design of regulatory mechanisms (adaptation and cohesion).

The VSM

The VSM (Figure 1) is perhaps one of the most insightful and powerful tools available today for studying the structure of organisations. It focuses on the resources and relationships necessary to support an organisation's viability rather than on the organisation's formal structure, thus offering a way to overcome the traditional over-emphasis on hierarchical relationships. Its basic assumption is that viable organisations emerge when people find successful strategies for working together, to the extent that they are able to develop and maintain a group identity in spite of environmental disturbances. These strategies entail creating, in one form or another, organisational mechanisms for the invention, re-invention, development and maintenance of the organisation over time. People, supported by all kinds of other resources, constitute these mechanisms. These resources create policies, and provide intelligence, cohesion, co-ordination and implementation capacity for the organisation; they provide its functional capacity. The structural problem is in creating the conditions for people to relate to each other in such a way that they enhance the organisation's chances for viability beyond survival. This requires respect for their autonomy in a cohesive and creative structural context. For instance, it is not good enough for an enterprise to have a well-designed business process relating it with its customers if it is not well supported by organisational processes. These are the processes both maintaining its autonomy and cohesion with other business processes, and ensuring that its meaning is aligned to the meaning of the organisation as a whole. These processes, underpinned by structural structural mechanisms, support the effective implementation and adaptation of the organisation's policies.

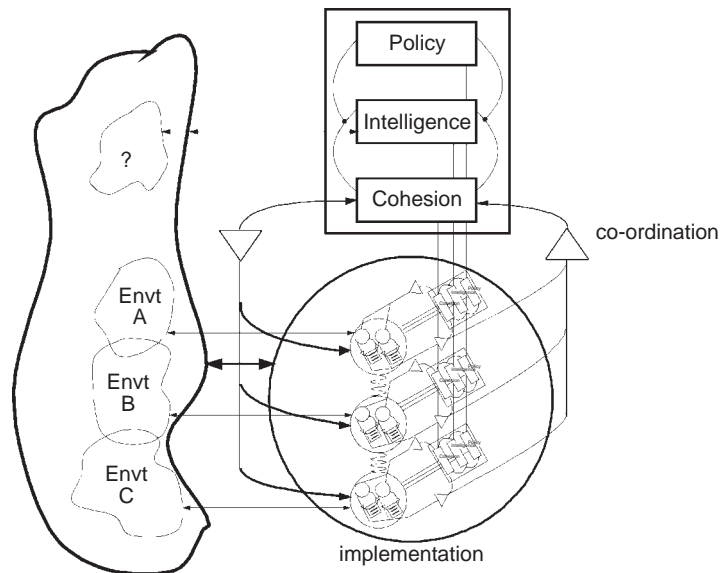


Figure 1.
The viable system
model

The relevance of the VSM is in the fact that it offers managers the chance to design and manage these mechanisms in such a way that people are allowed to contribute to the organisation's performance to the best of their abilities. Thus, these mechanisms are not rigidly defined, but are the outcome of organisational processes, in which functional capacity and interactions are assessed, and adjusted over time, by management. Therefore, the purpose of management is to enable a structure that provides people with adequate resources and communication channels to constitute effective interactions. Organisational processes, if well constituted, should provide people with a framework for the co-ordination of their actions. Equally, managing organisational processes should also mean keeping business processes aligned with global organisational policies; otherwise local improvements may be achieved to the detriment of global performance. Moreover, since the VSM is structurally recursive, it is expected that people throughout the organisation, and not just top managers, will be responsible for developing policies, and related enabling structures, within their areas of concern in the organisation. Indeed, if the organisation is truly effective, all people in it are participating in its policy formulation and implementation. The same organisational processes – the same needs for viability – are recurring everywhere. The mechanisms are independent of the content of the interaction; the same checks and balances, the same controls recur at all levels in the organisation and in all organisations; therefore they are equally relevant to large and small, profit and non-profit-oriented, Asian, African, or European organisations.

Viplan method

The Viplan method (Espejo, 1989; 1993a) offers an approach to work out effective organisation structures consistent with alternative organisational strategies. In other words, it offers an approach to designing organisations that are fit to fulfil their ascribed purposes.

Viplan is a method to support policy makers and managers in their management of people's interactions. It helps them to work out the necessary checks and balances in between people that allow them to achieve organisational adaptation and cohesion. This method is more concerned with producing *models for* people to understand their necessary interactions than with producing a *model of* the organisation. As such it is trying to capture the interplay between the meanings that people ascribe to their organisations, and the relations they develop to actually produce them.

Identity

The use of *identity statements* helps the relevant participants to capture this interplay. In Mode I, people base these statements both on their observation of existing activities and relationships within an organisation, and on realistic declarations of purpose. The concern is *theory-in-use* rather than *espoused theory*, so identity statements are very different from the aspirational "Vision statement" often developed by organisations. Identity statements express the

organisation's meaning for its participants, and make visible the "business areas" that the organisation is in, that is, the areas in which people in the organisation accept the challenge of viability. This is the complexity that the organisation must constantly create and absorb in order to remain viable.

Identity statements are a means to surface the way people experience their relevant organisations. We recognise that the identity of an organisation is about what the organisation *is*, rather than what it *does*, but, in Viplan we accept that stating the *doing* is a useful shorthand for the organisation's identity, and the surest route to establishing what the organisation actually *is*.

The identity statement says what the organisation does, who does it, who they do it for, on whose behalf they do it, and who else is involved. The identity is established by asking the actors within the organisation what the organisation does, and who participates in the related processes. The aim is to capture the "*what we do*" from a rich variety of sources and viewpoints representing different business concerns and perspectives. The answers obtained may be constructed as a mixture of espoused theories, that is, of meanings that participants ascribe to the organisation, but that not necessarily reflect the organisation's doing under sharper scrutiny. In order to achieve useful identity statements it is often necessary to orchestrate conversations among these participants in order to challenge them.

An identity statement (or a *system name* as it is also referred to in Viplan) is a concise but highly descriptive statement of the organisation as a total system, from a particular viewpoint. The TASCOI mnemonic is a useful aid to an insightful study:

Transformation: What input is converted into what output?

Actors: Who is involved in carrying out the activities entailed by the transformation?

Suppliers: Who are the suppliers of the inputs to the transformation?

Customers: Who are the ones receiving the outputs of the transformation?

Owners: Who has in the system an overview of its transformation?

Interveners: Who, from the outside, is defining the context for the system's transformation?

TASCOI helps to identify both the transformations that the system needs to perform to fulfil its self-defined purposes and the participants involved. This is the basis for discussing the relationships between them. The better these relationships are understood, the better the understanding of the identity and the better our understanding of structural requirements. There is a link between identity statements and organisational structures.

The use of the TASCOI formula ensures that all relevant stakeholders are considered in arriving at an identity statement. It is often helpful to express an

identity statement as “an organisation/unit/process to do X by means of Y in order to achieve Z ” (Checkland and Scholes, 1990). X is understood as the system’s transformation (or T), Y is the kind of resource used to produce the transformation and Z is the system’s purpose or the meaning ascribed to the system.

Producing an identity statement in Mode I (system diagnosis) involves agreeing a statement of current purpose by the stakeholders of an organisation, after a process of gathering evidence about what the organisation appears to be doing. An identity statement in Mode II (system design) involves declaring an intended identity in order to produce the related organisation. Quite naturally this should be part of a rich conversational process among the stakeholders.

Issues to be taken into account when developing an identity statement are:

- Primary transformations; which products/services are produced by the organisation?
- Needs satisfied by transformations; which customer needs are being satisfied by these products?
- Temporal factors; which time aspects influence producing our products/services (e.g. whether a JIT supplier or from stock)?
- Size and location of organisation; are we a global, regional or local operation?
- Relationship with the environment; are production activities dominated by a commercial or public ethic? What kind of relation does the organisation have with its own products, with their life cycle? What is the organisation’s commitment to recycling and disposal of old products?
- Related organisations; of which organisations is the organisation a member/citizen? Is it part of a larger corporation, or a member of a group of related organisations, or a community?
- Economic variables; which are the drivers supporting resources allocation? How do they affect the centralisation-decentralisation issue?
- Financial variables; is this a profit oriented organisation? Is it concerned with shareholders’ wealth? Is it a public service or a charity?

If we consider a hypothetical company, a workshop with the directors of Edison Ltd, a subsidiary of FIM plc, which designs and manufactures fork-lift trucks, it may make apparent two perspectives:

Edison’s is an autonomous company within FIM Group plc, which manufactures fork-lift trucks at the lowest cost consistent with high product quality.

This perspective emphasises the manufacturing tradition of the company.

The second, highly influenced by the marketing director, who joined the company from the airfreight handling industry five years ago, may offer this perspective:

Edison's is a company which uses its expertise to provide users with equipment to best satisfy their materials handling needs; both as a manufacturer of fork-lift trucks and as a supplier of third party warehouse fittings.

This perspective emphasises the need to develop synergistic relationships with manufacturers of complementary warehouse fitting products.

These two statements reveal very different views of the organisation's identity, and each implies different roles, activities, priorities, and therefore structures. The use of TASCOI and identity statement involves the surfacing and discussion of these differences, and might result in a more considered identity statement for Edison:

Edison is a medium-sized, autonomous company within the FIM Group plc, which uses its expertise to provide British and European users with the equipment which best satisfies their materials handling needs, both as a manufacturer of fork-lift trucks and as a supplier of third party shelving and storage bins in order to provide an acceptable return on investment to the Group.

We can study this identity as follows:

Transformation: Raw materials, automotive components, shelving and bins into forklift trucks and associated materials handling systems.

Actors: Staff and workers of Edison Ltd.

Suppliers: Raw materials and components suppliers, suppliers of storage equipment.

Customers: Users of materials handling systems.

Owners: The management of Edison Ltd.

Interveners: FIM Group plc, competitors.

Structural modelling

Transforming an identity statement into an appropriate structure, with the capacity to create and absorb the requisite complexity, requires an appreciation of the complexity of its implied technological and business processes. In Viplan, *structural models* are based on a number of strategic considerations, like relations with suppliers and customers, geographic coverage, technological processes and time.

The purpose of structural modelling is to start to examine the "independent chunks" of complexity that are fundamental to the organisation's strategy and the way that it works. These chunks are propositions or hypotheses of the way the organisation is managing the complexity of its total operations. They model

how the organisation relates to the complexity of its operations and its environment. They allow us to view the organisation's complexity in different ways, and to start to break down that complexity from different perspectives. There are several structural-modelling tools, relating to common drivers of organisational complexity and the way that organisations and their structures differentiate these drivers.

Technological models are models of the activities that produce the transformation named in the identity statement. They show which activities produce the transformation, and the way that these relate to one another. The purpose of constructing such a model is to explore the complexity of the task that makes up the transformation, and to allow us to assess its impact on the structure of the organisation. Figure 2 is a technological model of the process of diagnosing organisational problems using the Viplan method. It has been constructed based on Syncho's experience doing this kind of consultancy. It is presented as a *quantified flow chart* (Beer, 1975). Quantification can be done in a number of ways. In this example, we could quantify the activities on the basis of the aggregated number of man hours that each activity contributes to the process, or we could quantify it in terms of the value of the finished product added by each activity. What we choose to quantify in the model relates to the need to appreciate the relative complexity of each of the activities.

Clearly, each of these activities may need to be understood in much greater depth, and so the same type of model may be used to break down each of these activities into its constituent sub-activities.

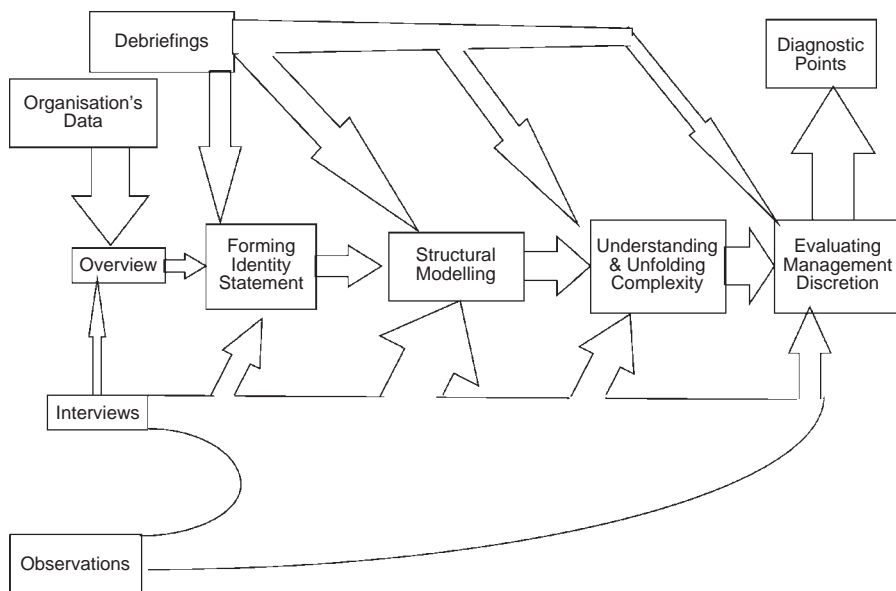


Figure 2.
Technological model of
Viplan process

Unfolding of complexity

In organisational terms, the large complexity of these (“business”) processes may suggest the need for autonomous units responsible for each of the process activities. Moreover, if their complexity is such that clear “chunks” of complexity within these activities may get the benefit of autonomous management, then we are recognising the need for autonomous units within autonomous units. On the other hand, as people doing these activities relate to each other, autonomous units may emerge from their interactions. This reciprocal structuration is at the core of carrying out complex tasks. These, emergent or constituted, autonomous units are called “primary activities” in Viplan. Therefore, the primary activity “company” may have the primary activities’ “divisions” within itself and these divisions may have the primary activities’ “strategic business units” within themselves and so forth, until the products or services of the organisation are delivered. The initial unfoldings (e.g. divisions within company and SBUs within divisions) may be easy to anticipate, but it becomes more difficult to visualise autonomous units as we get closer to the delivery of products or services, and tasks are broken down into smaller sub-tasks. However, in all organisations there is this kind of “unfolding of complexity”; to a large extent it is the outcome of natural self-organising processes. Within this natural process of unfolding, there are choices that can be made. The way in which the organisation’s complexity is unfolded, and the order in which it absorbs different aspects of complexity can have a profound effect on the performance of the organisation and on its ability to fulfil its ascribed purpose. The cost to the organisation and its participants of these processes of unfolding may be reduced by design. Viplan offers a methodology to carry out this design process through developing an understanding of the probable implications of different ways of unfolding the organisation’s complexity.

We will take as an example the government’s provision of roads. This might involve two activities – road construction, and roads maintenance, giving us two organisational units using the same technology and in the same geographical area and for the same customers. Most likely one road repair team and one construction team will not cover the whole country, it may only operate in a particular location, let us say Manchester. So to cover the whole country, there may be many such units which are divided by geography, perhaps on a county basis, all contained within the “Roads” agency, and each in turn containing a road construction and a road maintenance unit.

The “Roads” agency will itself of course be a part of a larger public sector body, say “Transport infrastructure”. In this case, it will be just one of several units that may be differentiated on the basis of technology, so roads may be one agency, railways another, urban light railways another. In this scenario, Figure 3 shows how the provision of roads is structured from the level of central government to an individual road project, and most importantly, the way that the complexity of this provision has been handled.

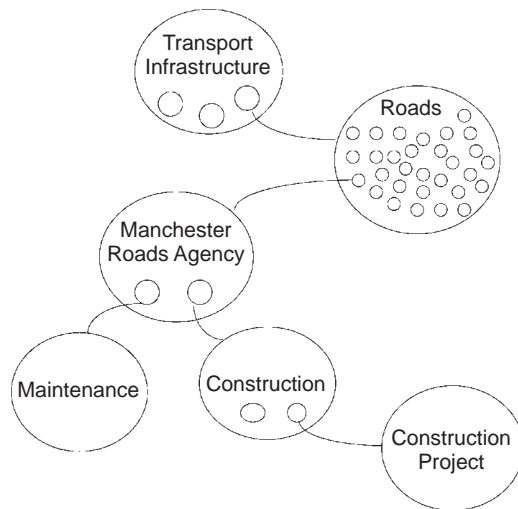


Figure 3.
Unfolding of complexity
– Model I

Although we have postulated this as a possible way of carrying out the structural division of transport infrastructure, it is by no means the only way of doing this. It could be done on a regional basis, with each county managing its own infrastructure, rail, roads, light rail, airports, etc., or alternatively, it could be that regional division is done at the lowest level, and that all road infrastructure, both construction and repair, is centrally controlled. A model for this might look like Figure 4.

The critical issue is that the provision of roads to all areas of the country is a complex task, and the way that this complexity is dealt with has profound implications for the way that the organisation operates and the way that it is managed.

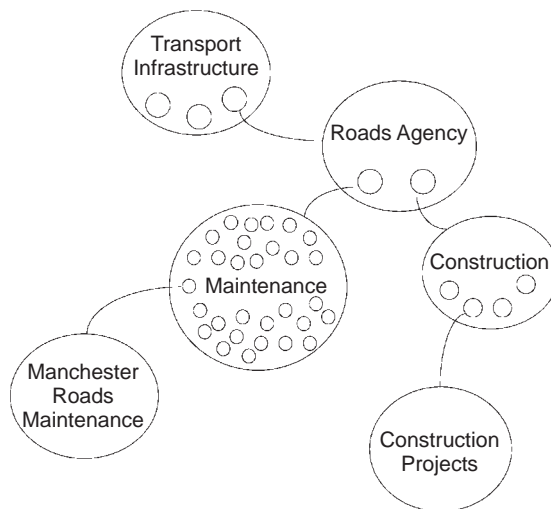


Figure 4.
Unfolding of complexity
– Model II

For example, in the first model in which we postulated a Manchester Roads Agency that handled both maintenance and construction, we can easily imagine that it would be possible for the two to swap resources of both personnel and plant as needed. The implications of this may be a more efficient use of resources, but a drop in the speed of response of the road repairs service when maintenance resources were committed to construction.

In contrast, such a pooling of resources would be near impossible using the second model, since construction is controlled centrally, and only maintenance is managed at a local level. There are of course many other implications not only for the operations but also for the management. It is necessary to unfold the organisation's complexity in this way if we are to understand what these implications are for any organisation. In particular, this method allows us to start to look at where within an organisation decisions can be taken, and how resources may be allocated.

All primary activities, at all structural levels, face the same problem: surviving in a complex environment. In other words, all of them need to develop basic mechanisms to cope effectively with their own and the environmental complexities. These mechanisms are referred to in Viplan as the mechanisms for cohesion (or monitoring control) and adaptation. These mechanisms are constitutive of all organisations regardless of cultural or historical considerations. They define the organisational structure of primary activities. Since all primary activities share the same need to manage complexity, albeit with reference to different concerns and business processes, all of them require the same organisational processes to be effective. This is known as the principle of structural recursion. What may vary from primary activity to primary activity within an organisation are their meaning, concerns and functional capacity.

Distribution of discretion

In the Viplan method, this functional capacity relates to the discretionary resources (and related functions) within each primary activity. Functional discretion may vary according to strategic considerations, that is, different aspects of functions/business processes may take place at different recursive levels. The distribution of discretion among primary activities is at the core of the centralisation-decentralisation issue in organisational design. If, in relative terms, too much discretion is retained at the corporate level, the flexibility of the lower structural levels may be hindered, their response to local changes may become ineffective. If, on the other hand, not enough discretion is left at the corporate level, economies of scale and synergy will suffer. Hence, the relevance of knowing how to achieve an effective distribution of discretion in each case. Currently, information technology is radically changing our views about the ways in which these issues of distribution can be tackled. In Viplan the distribution of discretion is modelled in a table of "recursions against functions", or in short, in the recursion/function table (Figure 5). This table relates functions like finance, marketing, order fulfilment, product development

Company	Legal	Capital Expenditure	Finance	Credit Control	Personnel	Training	Quoting	Sales	Marketing	Administration	Buying	Production Management	Prod'n Scheduling	Quality Assurance	Quality System	Process Development	Equipment Development	Maintenance	Factory Logistics
Components	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Light pressing					x							x	x	x	x				x
LP Cell 1												x	x	x	x				x
LP Cell 2												x	x	x	x				x
Heavy Pressing					x							x	x	x	x				x
HP Cell 1						x						x	x	x	x				x
HP Cell 2						x						x	x	x	x				x
Refurbishment				x			x												x

Figure 5. Recursion-function table for small manufacturing company

and so forth, to primary activities at their operational recursion levels in Mode I and their desirable operational levels in Mode II. In Viplan these functions are called *regulatory functions*.

The problems of agreeing the degree of centralisation or decentralisation of resources and decision making is directly related to the issue of autonomy of the primary activities within the organisation. Autonomy can be defined as the freedom, and responsibility, to determine one's own actions. In a way, it is not divisible; one either has autonomy or one does not. One may abrogate this right but will in the end suffer the consequences of not exercising it. In organisations, there may be doubts about which are the systems with autonomy, but we can hypothesise which they are. Autonomy can be exercised with varying degrees of discretion. Each of the primary activities is intended to be an autonomous system with discretion over certain functions, though they may be constrained in that discretion by the next level of recursion up. However, even the lowest level must have discretion over a minimum number of systemically required functions; otherwise it would have no action capacity, and therefore, would not be viable. To have discretion in a function, at a given level of recursion, means taking away from the levels below the discretion to act on that specific function, with those specific characteristics.

Each of the primary units needs to be an autonomous system. The crosses on the recursion function table indicate the amount of discretion that is being taken away by that level from the primary units below it. The more crosses there are at the global level, the more discretion the global level is taking away from the primary units. There are a number of diagnostic points that can be drawn from the recursion function table. Allocating discretion to the same function at different levels of recursion does not simply imply that all levels carry out the same aspects of that function. Each level should manage in a way relevant to the viability of the primary activity at that level. This ensures that decision making is devolved to the lowest practical level for each activity while an aggregated view is maintained at the level(s) above. This increases the ability of the organisation as a whole to adapt.

If there are several functions that are highly interrelated in terms of a business process but occur at different levels of recursion, then the likelihood is that the amount (intensity, pressure) of communication necessary between them would be difficult to achieve. In these cases the communications between them would be either inadequate, or too expensive to achieve. Re-engineering the process may help to overcome the problem. Where discretion over a function can be found at the global level and the local level but is missing in the intervening level(s), then an interesting diagnostic point is highlighted. If the local management need guidance on some aspect of that function, they will approach the global management for advice rather than their immediate supervisors. This is almost certain to cause some uneasiness among the management at the intervening level.

Viability demands that the mechanisms for viability (i.e. adaptation and cohesion) can be found in each of the primary units. However, particularly in

the local levels of the organisation one tends to find fewer, if any, functions concerned with intelligence. In these cases there is a diagnostic point that these primary units may not be truly viable. There are many more possible diagnostic points.

Diagnosis and design of structural mechanisms

Producing a VSM for the organisation is the final step of the Viplan method. This is done in a template that is produced by mapping the primary activities of the recursion-function table onto the implementation function (operations) of the VSM and the regulatory functions onto the policy, intelligence, cohesion and co-ordination functions of the VSM. The resources that are related to each of these functions define the functional capacity of primary activities. It is only at this point that a proper discussion of the relationships between the VSM (systemic) functions can take place. Which are the communication channels creating the relationship between intelligence and cohesion? Are their capacities adequate for the issues of concern? Are the (intelligence and cohesion) functions well balanced or is one of them dominating the other? Is the cohesion function monitoring the relevant primary activities? These and many more questions emerge at this point of the study.

The mechanism for adaptation. To remain viable an organisation must have the capacity to create new possibilities and adapt to new situations. In the case of a car manufacturing company this *creation* might be “inventing energy solutions based on their car manufacturing technology”, at the same time of adapting to “green pressures” for more fuel efficient vehicles and cleaner exhaust emissions. If the car manufacturer does not create these capabilities and adapt to these demands, by developing new technologies and models, then its long-term environmental fit will suffer, jeopardising the viability of the organisation.

The mechanism for adaptation is usually associated with strategic management and is constituted by the *policy, intelligence and cohesion functions*. The policy function is responsible for defining the organisation’s identity and in particular its business areas and their role within a particular context. In the case of the car manufacturer, the policy function would decide, based on internal debates, the company’s attitude towards the environment, what model ranges should be produced, what technologies they should employ, and what markets should be targeted. In order to make such decisions the policy function must foster the creation and development of knowledge in two main areas:

- (1) about the organisation’s external and long-term environment, i.e. what kind of future they envisage and want for the company, what kind of relations they want to develop with the markets, competitors, suppliers etc.; and
- (2) about the organisation’s internal and current environment, i.e. what are the organisation’s production capabilities, resources, skills and technology, etc.?

The functional capacity to create and develop this knowledge is provided by the organisation's intelligence and cohesion functions. The three functions, policy, intelligence and cohesion, constitute the mechanism for adaptation.

Diagnosing and designing this mechanism requires establishing the functional capacity supporting the above functions. This is first done with the support of the recursion-function table. This table tells us the capacity focused on intelligence and control within each primary activity.

The next task, perhaps the most important, is to study the communication channels between these functions. Often there are problems of poor communications between functions at the same level of recursion, not least because people in general do not recognise primary activities and recursions. There are problems of communication among the functions constituting intelligence and cohesion, as well as between intelligence and cohesion. One of the key concerns of the policy function is to articulate the communications between these functions with reference to specific issues of concern. The idea is to bring these functions together, so that they integrate their concerns with the primary activity's viability. Criteria to structure these communication mechanisms is given by both the need to have balanced interactions between intelligence and cohesion, and the identity of each primary activity, their specific policy concerns and the distribution of discretion within the organisation. It is crucial to balance the influence and contribution of the intelligence and cohesion functions with reference to each specific issue of concern.

The mechanism of cohesion. The mechanism of cohesion is concerned with integrating primary activities in an embedding organisation. This mechanism also recurs within all primary activities. Each of the primary activities, as an autonomous system, is exercising its own choice and defining its own implementation activities. If the whole is, however, going to be cohesive, primary activities have to accept the integrating framework of the embedding primary activity, the one in which they "agree" (willingly or not!) to operate. In other words, divisions agree to constitute the company, strategic business units agree to constitute the division, and so forth.

The interactions between two successive recursion levels in order to achieve cohesion are at the core of the VSM. In practical terms this last activity of Viplan gives criteria for the diagnosis and design of the cohesion mechanism. Does it make sense to work for the cohesion of "these primary activities" within the context of this organisation, or is it the case that the cost of achieving this cohesion is too high? Or, in the context of a holding group, does it make sense to acquire this enterprise or not? Or, in the context of an operating company, does it make sense to keep this unit within or is it better to sell it off, or, do we need to make this unit, so far not recognised as a business in its own right, a primary activity?

Following the VSM, Viplan makes apparent, in answering the above questions, that it is necessary to pay attention to interactions along six types of communication channels:

(1) *Interactions between primary activities*

These interactions, in general, occur as a matter of the nature of the technological model underpinning the primary activities. For example, in a steel mill there may be three primary activities which are sequential sets of processes such as iron making, steel making and rolling. Because each primary activity relies on the others for its inputs or products there will be strong links between them represented by the flow of material between the processes. In other businesses, however, the links between the primary activities may be less obvious and could be represented by the sharing of resources or expertise. Nevertheless, there should be some beneficial relationship between primary activities; otherwise there is little reason to have them in the same organisation.

(2) *Interactions in the environments of primary activities*

Primary activities interact through their relevant environments as well. They may have overlapping markets, or the outputs of one primary activity may affect the demand for another. For example, in a city council the Education Department and the Social Services Department interact through their common environments; better education may lead to a reduced strain on Social Services.

Designing the above interactions is a way of managing the creation of synergy among primary activities. This design itself may suggest the need to create particular primary activities. This diagnosis/design may take place as a result of studying the way “material/services flows or could flow”. Modelling the “technology in use” (cf. technological models) helps in this effort. Equally, “understanding” interactions in the environment may well be an effective manner to make the organisation’s task more manageable. Managing these interactions is a means of reducing the residual variety relevant to the organisation and, hopefully, to management. In this context the mechanism for cohesion is all about allocating resources to support particular interactions and develop particular forms of synergy. Paying attention to these interactions may produce a dramatic pay-off; it may help to see links where none were apparent, it may also help to reduce operational complexity at the same time as increasing performance.

The next four communication channels, between corporate (general) management and the embedded primary activities, are in the managerial domain and together constitute the cohesion mechanisms associated with the cohesion of primary activities.

(3) *Corporate intervention*

The corporate level issues directives and defines procedures that the primary activities are obliged to follow. There is no negotiation between corporate level and primary activities on these issues. Examples of corporate intervention are safety regulations, evacuation procedures and the banning of smoking in an organisation’s offices.

(4) *Resources bargaining*

The corporate level negotiates the allocation of resources to the primary activities. The primary activities are supposed to provide some form of return on those resources. Resources bargaining is the process by which the primary activities agree with the corporate level their programmes of work and the amount of resources that are allocated to them to achieve those programmes. This differs from corporate intervention in that it is a negotiated process. In order, however, to create the conditions for an effective negotiation, corporate managers need to appreciate what is going on within the primary activities; otherwise they can only rubber stamp local proposals. For this purpose they need to rely on the fifth communication channel.

(5) *Monitoring*

The cohesion function receives reports from the managers of the primary unit. But to rely solely on these reports to understand what is going on in the primary activities would be dangerous since the information passed up is likely to reflect the natural biases of those reporting and may not be sensitive to corporate managers' concerns *vis-à-vis* the primary units. Global management must create for itself a context for interpreting local reports so that they have a realistic view of the capabilities of the primary units. Sporadically monitoring the primary activities operations by-passing their management is a way to enrich the picture being given by local management.

(6) *Co-ordination*

Corporate management negotiates the allocation of resources with the management of the primary activities. The complexity of the organisational tasks requires that the primary units be given as much discretion as possible to avoid overloading corporate management with trivial problems. If the corporate level does not take away from the primary activities discretion to do their own planning, that is, if there is no centralised planning, there is a good chance that the resulting plans will be inconsistent, and since primary activities are operationally interconnected, this is likely to lead to bad performance. Co-ordination is a means to stop this happening. The organisation needs to set up mechanisms to make the co-ordination by mutual adjustment of primary activities possible.

The recursion-function table tells us the discretion that is taken away from each level of recursion by the more global level. In order to avoid unnecessary centralisation of these functions it is important to recognise the means to support local co-ordination in the context of a global function. This recognition may be done in a diagnostic or design mode.

The last four communication channels constitute the cohesion mechanism. The four channels have to be seen as a set of interconnected channels rather than as independent ones. In other words, resources' bargaining without monitoring

reduces the chances of either autonomous operation or meaningful negotiations. If the resource bargaining process is not supported by co-ordination, the complexity for management is much higher than it needs to be. Corporate intervention not supported by monitoring is likely to make nonsense, or reduce the relevance, of the intervention. All the above are diagnostic/design considerations.

Organisational analysis using the VSM and the Viplan method raises questions about the structures that underlie issues of organisational concern. At the same time, issues or concerns give rise to structural questions; all organisational activities take place in a structural context (Espejo, 1993b). In this sense the Viplan method is a tool for problem solving. It is seldom that a comprehensive modelling of an organisation is undertaken, more often issues of organisational concern drive the diagnosis and re-design of an organisation, or of a set of activities within an organisation.

Viplan learning system's functionality

The Viplan method is the outcome of many projects and assignments. It has evolved over the years from Syncho's work with a large number of organisations, large and small, in the public and private sectors.

The Viplan learning system is divided into two parts. The first deals with the VSM, the principles and concepts that underpin it and some of the archetypal organisational problems that are encountered. The second half deals with the Viplan method. Both sections consist of text and graphics, and are supported throughout by a case study taken from one of Syncho's consultancy projects. Where appropriate, other cases have been used to develop and illustrate particular learning points. In both the main body and the case study, the text and graphics are dynamically inter-related so that hotwords within the text drive changes within the graphics to illustrate the point being made. For users with different learning or cognitive styles, this interaction helps to reinforce and support their learning.

The latest version of the software has been written taking into account further requirements for self-learning, and incorporates both "Frequently asked questions" (FAQs), and "Self-assessed questions" (SAQs). The FAQs deal with the most commonly encountered problems that new users face in using VSM and the Viplan method for the first time. The SAQs allow the user to test their appreciation and understanding of the key concepts using questions that have model answers provided. Viplan also includes a relational glossary that works from keywords within the text.

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