

## ORGANISATIONAL STRUCTURE AND KNOWLEDGE MANAGEMENT: A CASE STUDY

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### **ABSTRACT**

The research sets out to investigate whether the organisational structure of an organisation impacts on the ability of the organisation to share knowledge. The research was limited to a single case study of an organisation in the telecommunications industry with a matrix structure and strong requirement for knowledge integration. The primary outcome is that the matrix organisation structure reduces the ability of the organisation to integrate and share knowledge. The weaknesses in the organisation come from the structure inhibiting the interaction and sharing of knowledge (too many departments, too many functional barriers); from the structure decoupling performance from reward (reduced recognition and feedback levels starving the motivation to share and integrate knowledge); from the structure not providing mechanism to share and integrate tacit knowledge, in particular; and from relying on, and hence overloading, formal organisation integrators to force coordination and integration. The research also provides a strong theory base that shows that knowledge integration can and should be used as the base for organisation design and that a strategic focus on strong knowledge integration can provide a sustainable competitive advantage for the company.

The name "Intelco" is used to retain anonymity for the case study company concerned.

## **1 INTRODUCTION**

Implementation of knowledge management in organisations has tended to focus on the soft issues, such as convincing employees to overcome their natural tendency to hoard information or to develop a culture of knowledge sharing for the benefit of the common good. The implication is that the management of knowledge in the organisation, and the way it combines to create new knowledge, is a peripheral issue that can be tackled by a dedicated few while the rest of the organisation gets on with business.

This assumption is tested by the emerging view of the knowledge organisation. Quintessential knowledge organisations, such as consulting companies or software development houses, clearly derive their competitive advantage from the knowledge of their employees and from the ability of the organisation to leverage this knowledge.

By extension, even mining, manufacturing and service organisations are knowledge organisations, since it is the combined knowledge of management and workers that allows these organisations to break out of the commodity downward price spiral to find competitive advantages in their markets.

The focus of this research was to look at the ability of an organisation with a strong matrix structure to encourage the sharing and integration of knowledge.

### **BACKGROUND TO THE STUDY**

The theory base for this research problem is drawn from two distinct research domains: Organisational Design and Knowledge Management.

According to Galbraith (1995), there are four main dimensions of organisational design: specialisation, shape, distribution of power and departmentalisation. For the purposes of this research the relevant issue here is shape. Shape refers to the span of control, or the number of people in each department. A strong hierarchical structure would have fewer people per department and many management layers. A flat structure would have more people per department and fewer layers. The trend has been towards organisations with a wider span since this allows for increased flexibility and encourages the development of self-managing

teams. Shape is critical for knowledge sharing, since the span of departments would directly influence the number of departments and hence the number of organisational 'fences' that need to be overcome to share information and insight.

Looking at matrix organisation structures in particular, Davis and Lawrence (1978a:4) in their book define a matrix structure as "... any organisation that employs a multiple command system that includes not only a multiple command structure but also related support mechanisms and an associated organizational culture and behaviour pattern." Three main reasons for a matrix structure have been identified; all three reasons need to be in place to justify the creation of a matrix. Firstly, the matrix is established in response to an external need for the organisation to have a dual focus, for example functional-product or functional-customer. What drives the need for a dual focus is market pressure: a functional structure encourages functional specialisation and a strong technical competence; a customer structure encourages customer orientation and intimacy. In a matrix, neither is allowed to arbitrarily override the other. Secondly, the matrix is created in response to an environment where the demands are constantly changing and unpredictable, with multiple markets and multiple products and a high level of interdependence between people. This type of environment could prompt the organisation to create a level of people who act and think as general managers within their product or customer domain. Third reason: strong pressure for shared resources such as expensive and highly specialised individuals that need to be flexibly redeployed. Davis and Lawrence discuss some of the observed problems with matrix structures and propose solutions for prevention and treatment in their book (Davis and Lawrence, 1978a) and in separate articles (Davis and Lawrence, 1978b). The problems listed are a tendency towards anarchy (no recognised boss), power struggles (matrix encourages organisational politics), severe groupitis (need for group decision making), collapse during economic crunch (instability under pressure), excessive overhead (double management due to dual chain of command), sinking to lower levels (matrix dies at the top of the organisation but is applied at lower levels), uncontrolled layering (matrix within matrix), navel gazing (internal preoccupation), and decision strangulation (referring decisions to both reporting lines, functional and customer). The authors indicate that the problems of the matrix listed above are often not inherent in the matrix concept itself but arise out of poor application or misunderstanding of how the matrix should work.

Grant (1996) proposes a knowledge-based theory of the firm, as rival and complementary to the many other theories of the firm. The knowledge-based view of the firm follows from the resource-based view of the firm in that knowledge is seen as the most strategically important of the firm's resources. Knowledge production requires specialisation; specialisation implies that individual specialists need to be coordinated. The market cannot perform this coordination function because tacit knowledge is poorly transferable and explicit knowledge is too easily taken without compensation. This implies that firms exist to create an environment where individuals can integrate their specialist knowledge to produce innovative goods and services. At the same time, without individual specialisation there is no reason for an organisation.

Grant dispenses with the concept of organisational learning by proposing that all organisational knowledge resides in the heads of individuals. This emphasis on the individual creates an initial link between organisational structure and knowledge management. Grant builds on this link by indicating that organisation theory tends to focus on how to make individuals cooperate (arising out of intra-organisational goal conflict), rather than how to coordinate their knowledge sharing to integrate their knowledge towards the organisational goals.

This theory makes two significant recommendations on how a knowledge-based theory of the firm would influence organisational structure: i) hierarchy and ii) distribution of decision-making authority. On hierarchy, Grant shows that hierarchical structures are not efficient at sharing the typically tacit knowledge of specialists. Grant proposes a team with fluid allocations of members to efficiently access the knowledge of specialists. On the distribution of decision-making authority, Grant points out that the quality of decision depends upon having relevant knowledge. Since tacit knowledge is difficult to transfer this implies that decision-making relying on the tacit knowledge needs to be made in a decentralised manner. Liebeskind (1996) provides an alternative justification for a knowledge-based view of the firm. She shows that it is almost impossible to protect knowledge in an open market and that even legal protection, such as patents - which have limited applicability - are often ineffective. Firms have three options that the market does not have: the firm can make knowledge the internal property of the firm and thereby only needs to share the product of that knowledge, firms can impose additional rules on employees through the employment

contract and firms can provide a future incentive for current knowledge work to encourage employees to stay with the firm and thereby protect the knowledge base of the organisation.

The knowledge-based theory of the firm, as proposed by Grant (1996) and Liebeskind (1996), is a useful starting point for a discussion on knowledge management and organisation structure because these theories embody both disciplines. If the 'reason for existence' of the firm is to create a closed environment where knowledge can be equitably shared and integrated to create better product and services for improved profitability then the next question is how the firm can be appropriately structured to maximise knowledge sharing and integration and hence profits. An alternative to the knowledge-based theory of the firm justification for considering structure, in the context of knowledge organisations, comes from Gold, Malhotra and Segars (2001). Through a factor analysis of a number of factors, Gold *et al* determines that structure should play a part in influencing the knowledge infrastructure capability of the organisation. Galbraith (1995) also makes the point, from another discipline, that certain organisation design considerations (specialisation, shape, departmentalisation) will impact on the ability of the organisation to manage knowledge.

With these theories as a foundation, the question arises what type of structure would contribute to the strengths of the knowledge organisation. Clearly, one way not to structure the organisation is to re-create the market within the organisation, since this will only replicate the problems associated with sharing and integrating knowledge in the free market. Tacit knowledge is too difficult to package for transactions (unless the result of the tacit knowledge, product or service, is transacted) and explicit knowledge cannot be marketed without giving away the actual knowledge. In Gartner *et al*'s model, individuals will only share knowledge that is no longer of value to them or of a value marginally less than the value being offered as a market incentive.

The organisational structure under examination in this research was the matrix structure. The defining characteristic of the matrix structure is a dual reporting structure along orthogonal organisational perspectives, for example the Functional and Customer perspectives. Matrix structures can take many forms: Galbraith (1971) shows that matrix sits on continuum from functional to project. Davis and Lawrence (1978a) shows that there are three reasons for adopting a matrix structure: market pressure for dual-focus, high information processing capability and pressure for shared resources and assets. Building on

the third reason (pressure for shared resources) it is clear that the matrix effectively creates an internal market for skilled resources with high tacit knowledge and, potentially, access to explicit knowledge. Employees will work to acquire the experience and knowledge to be pulled onto the more prestigious and recognised projects to thereby gain exposure within the organisation and so further their careers. This may be an appropriate solution if individuals can work on their own (or in small, focused teams) where knowledge integration and sharing is not required on a significant scale (for example, installation work teams). Applied to a knowledge organisation, the matrix appears to create an internal free market for knowledge – with all of the associated difficulties of sharing knowledge in a free market. Why share knowledge with fellow employees if all are competitors in a free market for advancement through recognition?

In a matrix organisation, individuals need recognition from the managers that have a direct influence on their careers through advancement, remuneration and development. The danger is that, while individuals make their contribution in a project in the customer dimension, their career decisions are made in the functional dimension. This means that there is a strong possibility of a disconnect between the two dimensions of the matrix, resulting in a further reduced incentive to share and integrate knowledge because this behaviour will not be recognised in any case and further driving the employee's strategy to get onto high visibility projects.

Galbraith (1995) puts the matrix structure into a formal framework by explaining that lateral processes always underpin the formal organisation structure (functional, product or process). Lateral processes can be informal, formal, or integrators. Matrix structures are a special case of integrating lateral processes. The purpose of the integrator is to bring a general manager perspective on a focus of the organisation (for example, customers). Integrators need to have a measure of authority over the active resources, in order to have an overall impact and so that they can be held accountable.

In order to get some perspective on the problem at hand, it needs to be made clear that this case study looks at the specific problem of a single company, in a single country.

## OBJECTIVES OF THE STUDY

This research investigated the extent to which organisational structure either supports or undermines knowledge management practices. The research specifically examined one form of organisational structure: the matrix organisation. The matrix organisation structure was a suitable candidate for this task because matrix theory predicts that matrix organisations are able to share information more readily than traditional functional organisational structures. Proving or disproving that the matrix structure supports or undermines knowledge integration does not imply that this applies universally to all structures. But it would provide an example of structure influencing the effectiveness of knowledge integration.

The research problem was further reduced by focusing on a single company to explore the relationship between knowledge integration and organisational structure. Intelco is a company that has chosen to resolve the conflict between customer focus and functional technical excellence by adopting a highly matrixed organisational structure. This matrix has been applied equally to the productive output as to the more pure knowledge aspects of the business. Intelco was thus an ideal case study candidate to show whether the matrix organisational structure supports or undermines knowledge management practices in the organisation.

Intelco is structured on a Functional basis to ensure strong technology depth that forms the foundation for building solutions. Each of the Integrators (Key Accounts, Project Management, Service Management) acts on the functional structure according to the milestones of the project. The Key Account retains overall customer accountability over the life of the project and the service phase.

The structure of Intelco can therefore be described as a process oriented functional-customer matrix structure. This structure and organisational principle is applied to the pure knowledge work component of the organisation (pre-acquisition, acquisition, solution design) as well as the project execution part of the organisation (logistics, installation, commissioning).

The perspective of the functional resources of the organisation is therefore as follows:

- Functional superior, responsible for their performance, development and remuneration and promotion

- Key Account, for pre-acquisition and acquisition projects
- Project Management for the execution of projects
- Service Management for customer support

On a day-to-day basis, functional resources would spend their full day working on projects other than for the functional superior. The functional resource therefore perceives four different types of bosses. Aside from this, the functional resource would invariably be working on a number of projects in parallel, with different Key Accounts, Project Managers and Service Managers.

The research focused on the following specific sub-problems that link back to the main problem:

Do the individuals in the functional departments of the matrix organisation perceive whether the organisational structure supports information and knowledge sharing?

Do the individuals in the functional departments perceive the organisational structure as a barrier to communicating information and knowledge?

Are the individuals in the functional departments resistant to sharing information and knowledge with other functional departments?

Does the organisational structure restrict individuals from sharing information and knowledge with other functional departments?

The purpose of the research was to make an academic contribution to the body of knowledge of matrix organisations and knowledge management in the relatively neglected field of investigating the link between organisational structure and the knowledge organisation.



## 2 METHODOLOGY

The methodology of the research was based on a case study of the current situation within Intelco. The case study was developed using a mixture of quantitative and qualitative methods for the purpose of assessing the research question within the context of Intelco. The case study method was used to assess, in the case example of Intelco, whether the specific organisational form of the matrix detracts or supports knowledge management in the organisation, within the broader context of Organisational Structure and Knowledge Management.

Yin (1981) defended the case study method for research by emphasising that the case does not necessarily have to define a universal principle but could be used to demonstrate the applicability of theory to a practical environment. It would then be left open to the research community to assess whether the case has broader implications and application. Intelco represents a single case within the broader telecommunications and electrical engineering industry. The data presents a snapshot of Intelco during the month of September 2004. Intelco was chosen as a case study because the organisation was readily accessible to one of the co-authors on the basis that he is employed there.

The sampling method chosen for the research was a probability-based cluster sampling based on the following departments directly involved with the acquisition process, as shown in the following table:

**Table 1: Sample clusters**

Department	Function
Sales Key Accounts	Manage the customer interface, leadership role in the account team, overall profit and loss responsibility
Technology Solutions	Technical Sales, preparing technical offers, statements of compliance for tenders
Solutions Design Architects	Overall solution design, ensuring that the final offer is integrated and internally consistent
Network Engineering	Network dimensioning, high and low level system design

Operations Central Support	Quotation Office for Services required to implement the solutions
Service Sales Support	Technical Sales for services, designing new service offerings
Service Management	Maintenance and After Sales support, warranty issues
Sales Support	Support department to assist Sales Key Accounts in tender preparation

The choice of the departments involved with the acquisition process as the basis for the clusters comes out of the fact that the acquisition process purely deals with knowledge work and knowledge workers that produce a tender bid or offer that embodies the organisation's best understanding of what it will take to acquire the additional business. The acquisition process is particularly knowledge intensive, especially in the context of a rapidly changing telecommunications industry, and is thus highly suited to the problem of determining whether the matrix structure supports a knowledge organisation. Overall, the sample represented a random set of managers and employees from the functional departments involved in the acquisition process at Intelco. The data was collected using a questionnaire consisting of two parts. The quantitative part of the questionnaire is based on questions proposed by Gold *et al* (2001). The question of alliances was omitted from the questionnaire since this was not a question that general employees would be able to make an assessment on. The question of employee accessibility was extended to include colleagues in the question to increase applicability of the question. Following on the issues raised by Grant (1996), the question of common knowledge and tacit knowledge was included in the questionnaire.

The qualitative part of the questionnaire consisted of two open-ended questions to get a sense of what the main factors are driving knowledge sharing. These questions were:

Q1: Describe the main barriers for sharing knowledge across the functional departments of the organisation for the purpose of creating new, innovative knowledge.

Q2: Describe the kind of incentive that would encourage you to share knowledge across the functional departments of the organisation for the purpose of creating new, innovative knowledge.

Sample Validity: the sample group consisted of 107 people, chosen on the basis of a probability-based cluster sampling, based on departments directly involved with the acquisition process. This sample addressed most of the employees directly involved in the acquisition process and at least 30% of all pure knowledge workers in the company. As such, the sample provides a strong base for the findings.

Survey Response Rate: the questionnaire survey was emailed to each of the participants. Of the 107 questionnaires sent out 72 were returned, indicating an overall response rate of 67%. The polling and response rate from each of the departments is given as follows:

**Table 2: Survey Response Rate**

Department	Polled	Responded	Response %
Sales Key Accounts	24	14	58%
Technology Solutions	33	25	76%
Solutions Design Architects	14	10	71%
Network Engineering	16	8	50%
Operations Central Support	9	8	89%
Service Sales Support	2	2	100%
Service Management	3	2	67%
Sales Support	6	3	50%

The overall response rate and the response rates of the individual departments indicated a high level of participation and therefore that the data represents the opinions of those departments to a significant degree.

Questionnaire Validity: the questions for the questionnaire were drawn from the literature survey done. The base of the questions came from Gold *et al* (2001), Grant (1996) and Sveiby (2001). As such, the questions provided a solid basis for the subsequent findings. The

qualitative questions provided a strong support for the quantitative questions by being posed relatively open-ended and drawing a wide variety of responses. It would have been useful to enhance the qualitative questions to draw out what strengths the organisation structure had that encouraged knowledge sharing but it was not possible to issue a follow-up questionnaire given the time restrictions of this research.

Data analysis: in general, the data from the survey was processed using quantitative analysis for the quantitative data and content analysis for the qualitative data. This information was then compiled in tables and graphs. Conclusions were drawn from this information through interpretation in the context of the literature survey which allowed the findings to be presented as key issues and key questions.

Relative significance of factors: an attempt was made to correlate the various factors against the two factors assessing effectiveness and optimality of the acquisition process according to the following equation for the correlation coefficient (Wegner, 2002):

$$\rho_{x,y} = \frac{\text{Cov}(X,Y)}{\sigma_x \cdot \sigma_y}$$

Each of the factors in the questionnaire (X) was correlated against the two questions relating to the effectiveness and optimality of the knowledge production process (Y).

This allowed a first assessment of what the critical factors influencing knowledge integration performance could be. Correlation does not imply causality. A high correlation needs to be interpreted as the respondents that hold a view on a particular factor holding an aligned view on the effectiveness or optimality of the knowledge sharing process.

### 3 FINDINGS

The key result to come out of the research was the perception among respondents that the structure of departments and divisions inhibits interaction and sharing of knowledge. In general, the findings indicate that, in the case of Intelco, the matrix organisational structure has a tendency to undermine the ability of the organisation to share and integrate knowledge. Individuals in the departments of the matrix organisation perceived that matrix organisation structure does generally not support information and knowledge sharing and tends to be a barrier to communicating information and knowledge. The individuals themselves indicated that they were not particularly resistant to sharing information and knowledge with other departments; rather the organisation structure appeared to restrict individuals from sharing information and knowledge with other departments.

Of the 72 respondents to the survey, 54 thought that the structure inhibits interaction and sharing of knowledge. Of those, 11 felt very strongly about it. The significance of this result can be seen by considering the following result. Respondents were asked to rate the effectiveness and optimality of their knowledge outputs (defined as tenders, quotes, and proposals). 28 respondents felt that organisation's knowledge outputs (tenders, quotes) were not effective, while 21 respondents felt that they were. A large middle was undecided about whether the outputs were effective or not. While the histogram indicated a bias towards ineffectiveness (skewness = -0.288) the result was not conclusive overall. 41 respondents felt that organisation's knowledge outputs (tenders, quotes) were not optimised, while 7 respondents felt that they were. The response did not indicate a significant view that the knowledge outputs were effective, which is a cause for concern. There was a small minority view (1) that the knowledge outputs were very effective; while there were more respondents that had a strong view that the knowledge outputs were ineffective (7). The strong middle (and concentration around the middle) reflects a view that, somehow, the organisation still manages to win tenders and orders on the basis of the knowledge outputs produced so that, while they may not be as effective as the respondents themselves would want them to be, they still manage to do the job.

The correlation between respondents who thought that structure inhibited knowledge integration and those that thought the knowledge output is ineffective was 0.490. This means that in the minds of the respondents, there is a strong correlation between the

structure of the departments and divisions and the ability of the organisation to submit effective tenders. Interestingly, those respondents that thought that the organisation's tender outputs are effective also thought that the structure does not inhibit interaction. Since this is a minority view, this implies that these individuals have found a way to work around the structure, or even make the structure work for them. A correlation of 0.49 clearly indicates that structure is not the only factor influencing the effectiveness of knowledge outputs. This is in line with Gold *et al* (2001) who found that structure, technology and culture all contributed to Infrastructure Capability which in turn combined with Process capability to influence organisational effectiveness. But it is also clear that structure is perceived to be a strong inhibitor of optimal knowledge work performance.

If structure is inhibiting knowledge sharing, what is it about the structure that is doing this? One of the questions in the survey asked whether the structure facilitates the transfer of new knowledge across structural boundaries. The median response to this question was 1 on a scale of 0 to 4. This score reveals a perception that the structure does not facilitate the transfer of knowledge across boundaries. This implies that, in the minds of the respondents, there is a strong correlation between the functional boundaries and the ability of the organisation to submit effective and optimal tenders. Respondents that responded with a low score to this question had a clear concern that the multiplicity of functional departments is getting in the way of working together effectively.

Opinion appears to be split on whether the organisation encourages employees to go where they need, regardless of structure. 28 respondents felt it did not while 21 respondents felt that it did (skewness = 0.192). 23 did not feel strongly about it either way. This normal distribution of the response indicates that the experience of respondents is not due to a system, despite a slight system bias towards the negative. This is a significant finding since it implies that the respondents are very functionally oriented with only those that, of their own accord, deciding to look outside their functional department for knowledge actually doing so. The result indicates that there is no formal organisational mechanism for ensuring knowledge integration and sharing across the functional boundaries.

In looking at the structural barriers, the respondents were asked to describe the main barriers to sharing knowledge. The dominant issues were around structural barriers.

**Table 3: Qualitative statements of factors inhibiting knowledge sharing**

<b>Response</b>	<b>Frequency</b>
<b>Structural barriers</b>	<b>60</b>
Departments too specialised	11
Too many silos, too many departments	6
Knowledge spread over too many departments	9
Too much separation undermining personal contact	11
Functional departments not aligned	6
Too much overlap, poorly defined roles	4
Processes not optimised (templates, policies, etc)	13

Weaknesses in the structure include departments being too specialised, too many silos, too many departments, knowledge spread over too many departments, too much separation undermining personal contact, and functional departments that are not aligned.

Matrix structure and the knowledge reward system: asked to describe the kind of incentive that would encourage the respondents to share knowledge across the functional departments, the respondents provided the following categories of response shown in Table 4:

**Table 4: Qualitative statements of factors incentivising knowledge sharing**

<b>Response</b>	<b>Frequency</b>
Recognition and Feedback	28
Monetary Bonus	17
Just part of Job	13
Align departmental goals	9
Points rewards scheme	6
Allocate time (resourcing)	5
Training	4
Job Rotation	3

Reciprocity	3
Tooling and improved processes	3
Gifts	3

The most significant factor to emerge out of all of the respondents was recognition and feedback. A large number of respondents made this their sole incentive. This has two implications: 1) individuals are not getting the recognition and feedback at the moment, 2) knowledge sharing and integration could be significantly improved by increasing recognition. Recognition was suggested in many forms: appreciation, feedback, and acknowledgement. Some individuals made a point of highlighting recognition from management. The issue of acknowledgement of knowledge ownership came up too and the suggestion to recognise a Top 10 Knowledge Workers list in a company forum. The dominant themes were 'Recognition and Feedback' and 'Align departmental goals'. The rank of the 'Monetary Bonus' factor is not surprising and is the sign of a healthy, rational economic mind – who does not want to earn more for their value-add? The 'Just part of Job' factor is interesting but is not helpful in addressing the question at hand; although it does provide some interesting support for the Knowledge-based view of the firm.

In a matrix organisation, employees make their contribution in the integrator dimension, working and making their contribution on projects that their functional supervisor may or may not be aware of. Employees are working on multiple projects simultaneously for multiple integrators (account managers, project managers, service managers) in multiple accounts. Employees are expected to report into both matrix dimensions (functional and integrator) but the assessor of the employee's ability and contribution is the integrator. Without an immediate feedback loop from the integrating manager to the functional manager the day-to-day contribution of the employee is lost. Even with an informal feedback loop, the information would tend to become stale and 'disconnected' from the reality of events. In short, matrix structure plays havoc with the traditional recognition mechanisms that are critical in motivating innovative and creative knowledge work. The matrix structure also plays havoc with goal alignment within the organisation. The integrator needs high performance, innovative and creative knowledge workers to compile knowledge outputs (tenders, proposals) that will win business in a competitive market. The functional manager is concerned with retaining staff to maximise capacity and grow the tacit knowledge



(experience, insight) within the department. When knowledge workers do not fully meet the expectations of the integrator, there is no incentive for the functional manager to take disciplinary action because this could lead to a reduction in the capacity of the department (especially in a recruitment freeze scenario).

These two factors further create an environment with a tendency for breeding mediocrity because good performance is not recognised and bad performance is not disciplined. This in itself would not be a problem, except that the respondents of the survey indicated that their best incentive to share and integrate knowledge with their colleagues would be to be recognised for the knowledge contribution that they are making. The matrix structure appears to rob the employee of their source of motivation and so undermines knowledge sharing and integration.

Discrepant views between integrating and functional departments: the integrating departments (Sales Support, Sales Key Accounts) have responded differently to the survey compared to the functional departments (Technology Solutions, Solutions Design Architects, Network Engineering, Operations Central Support, Service Sales Support, Service Management). This is a significant finding because the integrators have a unique view of the organisation that spans across all departments, compared to the functional departments that would interface to the integrators and a lesser number of neighbouring functional departments.

On the whole, the Integrators tend to be more negative than the functional departments. Integrators feel stronger that the structure of the departments inhibits the interaction and sharing of knowledge, have a stronger sense that the organisation does not design processes to facilitate knowledge sharing across functional boundaries, does not encourage employees to go where they need regardless of structure, do not perceive that the structure facilitates the transfer of knowledge across structural boundaries. Why this negative view? The integrators have the task of coordinating the, often tacit, knowledge sharing and integration of the whole spectrum of functional departments, using the most inefficient, default, coordination mechanism: group decision-making. The integrators therefore see the structure at it's most inefficient. Also, integrators are closest to the final result and have had to deal with the complexity of the organisation to get there.

#### 4 RECOMMENDATIONS AND CONCLUSIONS

The research set out to show whether the matrix organisation structure of Intelco, either supports or undermines knowledge sharing and integration. The outcome is that, in the case of Intelco, the organisation structure does influence the ability of the organisation to integrate knowledge and encourage knowledge sharing to produce innovative and effective tenders and customer proposals. This outcome has four main causes.

The organisation has too many departments. These depend on the key accounts to coordinate the integration and sharing of knowledge among the department. This form of coordination is extremely inefficient because it takes the form of group decision making which is the least efficient method for coordinating knowledge integration. The structure undermines traditional feedback and recognition systems by breaking the link between who measures performance and who allocates performance rewards. This is significant because respondents indicate that, for them, recognition is the dominant motivator for sharing and integrating knowledge. The organisation weakens the ability of line function management to motivate their staff to share and integrate knowledge. The structure does not address the high level of tacit knowledge in the organisation. Tacit knowledge is not usually spontaneously shared and integrated because this is a difficult and time-consuming process. Employees see their tacit knowledge advantage as their own competitive advantage over other employees because the matrix structure creates a knowledge market. It is left to the account managers to encourage employees to work together and share their tacit knowledge for the benefit of a tender and break the functional silos. The implication appears to be that knowledge can be pulled out of the organisation, but that there is no pro-active sharing of knowledge without explicit pressure. Which brings the issue to the account managers who appear to have a more negative view of the organisation structure than the functional departments. The account managers, together with project managers and service managers, are the three official *Integrators* in the Intelco matrix structure. This negative view indicates that, to some extent, the task of coordinating the sharing and integration of knowledge is overwhelming them and hence the task is not being performed as effectively as required to make the structure work.

What is clear, is that in the case of Intelco, trust and common knowledge among employees is not a barrier to knowledge sharing and integration. In general, the findings indicate that,

in the case of Intelco, the matrix organisational structure has a tendency to undermine the ability of the organisation to share and integrate knowledge. Individuals in the departments of the matrix organisation perceive that matrix organisation structure does generally not support information and knowledge sharing and tends to be a barrier to communicating information and knowledge. To the extent that the matrix structure creates an internal market for, mainly tacit, knowledge this cannot work.

The theory base, in particular the work of Grant (1996) and Sveiby (2001), indicates that structure, far from impeding knowledge sharing and integration, could be applied to create an environment where the integration of knowledge is actively managed so that the firm can create more innovative products and services. In closing, knowledge is extremely hard to integrate and there is no need for the structure to make it any more difficult than it needs to be.

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