

“An introduction to Knowledge oriented Strategy KoS and Strategic Knowledge Management Capabilities”

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This paper examines developments in the fields of economics, management and information and telecommunications technologies in the context of the growing global knowledge economy. It highlights the convergence of management and technological drivers towards Knowledge oriented Strategies which will be supported by strategic knowledge management capabilities exploiting synergetic developments of strategy, knowledge dynamics and semantic based technologies.

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Background

For the last two hundred years, neo-classical economics has mainly recognised two factors of production: labour and capital. However, in recent years, information and knowledge are replacing capital and energy as the primary wealth-creating assets, just as the latter two replaced land and labour 200 years ago.

In the 1990's, the 'knowledge economy' and the 'information society' became the recognised cornerstones of the developed economies. This was reflected in a 1998 world development report stating: "for countries in the vanguard of the world economy, the balance between knowledge and resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining the standard of living - more than land, tools and labour". Consequently, knowledge has been heralded as the key national and company asset but it is difficult to measure, reproduce, diffuse, develop and use efficiently.

More recently, the World Bank's prospective document for Knowledge Assessment suggests the importance for countries to analyse their capabilities for participating in the knowledge revolution. Nations are prompted to examine how their knowledge assets are acquired, sourced, created and utilised in order to devise policy and strategy that fosters the growth of their knowledge economy. Knowledge assets represent the foundation of competencies and capabilities that are deemed essential for growth, competitive advantage, human capital development and quality of life.

The emergences of the global knowledge economy and the associated demands on business strategy have been well understood since the 1980s when the learning organisation concepts became popular. Then, the message was that "the emergence of a knowledge based economy requires a new synthesis of training, education and other forms of communication and learning under the single umbrella of the learning enterprise" [L T Perelman 84]. The learning enterprise was also seen as an intelligent enterprise capable of managing efficiently knowledge based activities, which were shown to be the key to productivity and wealth generation in over 75% of all economic activity¹.

These days companies recognise the worth of their intellectual capital and are beginning to account for it in their balance sheets². There is considerable evidence that the intangible component of the value of high technology and service companies far outweighs the tangible value of its physical assets, such as buildings or equipment. The physical assets of companies

¹ "Services restructure the economy" J B Quinn 92.

² A Socioeconomic Resource Statement reports the resources the organization has available to create value in the future. Such statements includes the items on the organization's balance sheet (economic and physical capital), as well as several new components-human capital, organizational capital, and relational capital; Dzinkowski 1998; Guthrie , Petty, and Johanson 2001; Roslender and Fincham 2001; Seetharaman , Soon, and Saravanan 2002).

such as Microsoft or Nokia are a tiny proportion of its market capitalisation. The difference is its intellectual capital.

Strategic trends

In this section, we review the broad economic and technology trends that are shaping the opportunities and threats for the future of business organisations. The objective is to set out the broad strategic perspective influencing the requirements for Knowledge Management solutions.

Economics

In the last decade, a major preoccupation for economists has been to establish a clear understanding of the so-called New Economy. The New Economy Index³ provides interesting insights on knowledge management requirements. The indicators proposed are divided into three groups.

The first group tracks some of the elemental structural changes that collectively mark the transition to the New Economy:

- industrial and occupational change;
- globalization;
- the changing nature of competition and economic dynamism;
- progress of the information technology (IT) revolution.

The second group examines the implications of the transition for the labour force:

- incomes and economic growth;
- job characteristics and prospects;
- employment dynamics.

The third group assesses national performance in terms of three main foundations for growth of the New Economy:

- the pace of transition into a digital economy,
- investment by business and government in technology and innovation,
- progress on the development of education and skills.

According to New Growth economics a country's capacity to take advantage of the knowledge economy depends on how quickly it can become a "learning economy". Learning means not only using new technologies to access global knowledge, it also means using new technologies to communicate and share innovations. In the "learning economy" individuals, firms, and countries will be able to create wealth in proportion to their capacity to learn and share innovation (Foray and Lundvall, 1996; Lundvall and Johnson, 1994).

³ <http://www.neweconomyindex.org>

Management

The increased prominence of knowledge related economics from the beginning of the 1990's have co-existed with the development of a new view on business strategy that emphasized **resource efficiency** rather than the generally accepted competitive forces. The Resource Based Perspective highlights that companies have differentiated resources, capabilities, and endowments⁴. It also creates an understanding of strategy formulation addressing intangible resources, (Hall, 1992), for the growing knowledge-based services and knowledge-intensive industries (Sveiby, 1992). One of the principal insights of the Resource Based Perspective is that not all company resources are of equal importance or possess the potential to be a source of sustainable competitive advantage. Much attention has focused therefore, on the characteristics of **advantage-creating resources**, which possess barriers to both imitation and mobility (Peteraf 1993; Teece, Pisano and Shuen 1997). **Leveraging resources and capabilities in many products for different markets** rather than focusing on specific products targeting specific market segments **becomes the strategic driver**. The Resource Based Perspective of corporate strategy⁵ advocates that competitiveness is sustainable primarily through dynamic knowledge capabilities, which can be difficult to imitate or acquire. Teece et al (1990s) in their paper on 'dynamic capabilities' emphasise on knowledge as a source of competitive advantage through the following definition of dynamic capabilities:

"The term 'dynamic' refers to the shifting character of the environment; certain strategic responses are required when time-to-market and timing is critical, the pace of innovation is accelerating and the nature of future competition and markets is difficult to determine. The term 'capabilities' emphasizes the key role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organizational skills, resources and functional competencies towards a changing environment". The emphasis, from this definition, is on adapting to the changing environment through knowledge management supported innovation.

Overall, management literature shows two main streams that discuss knowledge. The first, referred to here as the 'learning stream', is based on an approach that views knowledge as an entity and discusses the differences between information and knowledge and the associated implications for knowledge management. The second stream, referred to as the 'intellectual capital steam', concentrates on knowledge as a corporate or national asset that has to be measured, accounted for in the value of the company, and managed in order to increase corporate value.

In the 'learning' stream, knowledge is considered as information with an applied interpretation process that guides action (Davenport and Prusak, 1998; Liebowitz and Wright, 1999;). The attention is on the different features of knowledge that could help managers to introduce

⁴ "Resources, Firms and Strategies" Edited by N J Foss Oxford University Press 1997

⁵ Wernerfelt B. 1984. A Resource-Based View of the Firm. Strategic Management Journal 5: 171-180

Wernerfelt B. 1995. The Resource-Based View of the Firm - 10 Years After. Strategic Management Journal 16(3): 171-174 .

knowledge oriented strategies and processes (Nonaka and Takeuchi, 1995; Spender, 1996; Dyer and Nobeoka 2000; Vermeulen and Barkema 2001; Albino et al., 2001).

The 'intellectual capital' stream of research defines knowledge assets as a major part of an organisation's value. The research focus on classifying, measuring and managing intellectual capital (IC) to help performance improvements (Teece, 2000; Roos et al., 1997; Stewart, 1997). According to Strassman (1998), intellectual capital is what is left over after suppliers, employees, creditors or shareholders and the government have been paid, and obsolete assets replaced.

The two different streams are complementary and provide the cornerstones for the definition of a managerial framework to identify, assess, exploit and manage organisational knowledge. One tool that is now widely used by US companies is Kaplan and Norton's Balanced Scorecard, which combines financial with non-financial measures, such as internal business processes, learning and growth, and various customer-related measures (Kaplan and Norton, 1996).

Information and Communications Technology (ICT)

A number of ICT development streams are relevant to Knowledge Management. They include cognition, Artificial Intelligence, intelligent decision making and problem solving, organisational memories, ontologies, and intranets. However, three key developments have a significant impact on the strategic development of Knowledge Management capabilities:

1. Mobile communications
2. Dynamic integration (web services and intelligent agents)
3. Semantic solutions

Mobility Next Generation Networks (NGN)

The Next Generation Networks (NGN) denoting the infrastructure that will enable advanced new services to be offered by mobile and fixed network operators represents the mobility advancements. Key objectives include:

- Support for a wide range of services and information flows (including real time/streaming/non-real time services, point-to-point, multipoint, broadcast and multicast voice, data, video and multi-media applications),
- Seamless inter-working with legacy networks,
- Support of 'generalised' mobility.

Dynamic Integration

Enterprise integration enables coordinated and synchronised execution of activities across employees and business partners through timely availability of the necessary and knowledge.

Web Services and their related infrastructure for service-oriented computing provide a universal basis for the integration of business processes that are loosely-coupled and distributed among the most disparate entities, both within an organization (e.g. different departments within the company) and across organisational borders (e.g. the partners in a supply chain). The

cornerstone for web services is XML which has provided the means to describe computer programmes.

Information agents are computational software systems that have access to multiple, heterogeneous, geographically distributed information sources, and assist their users to find both useful and relevant information. Intelligent agents implement retrieval, analysis, manipulation, and integration of heterogeneous data and information on demand.

An important of dynamic integration is the "*dynamic discovery*" which describes systems, in which clients search through special registries to first discover and then invoke services supporting the capabilities they require.

The Semantic Web and Semantics-based solutions

A unifying vision for all ICT developments is that of the Semantic Web with semantic annotation of data so that programs can understand each other⁶.

We are currently at the beginning of this new generation of the World Wide Web, which will provide a wide range of intelligent services such as information brokers, search agents, information filters etc.

The Semantic Web will become a huge knowledge system with ontologies providing the primary means to code this kind of knowledge. Ontologies provide the means to describe concepts enabling inference to be made. Automation of creating ontologies from existing information sources and providing learning ontologies will certainly create a new level of knowledge management capabilities.

The next step is to use semantics to understand information and decision making needs of humans, so that data and human's needs can be semantically intermediated. The scope of semantics-based solutions has also moved from data and information to services and processes.

The New Economics of Information

The rate of technological change has greatly increased over the past thirty years. Three laws have combined to explain the economics of information (Gilder, 1994).

Moore's Law holds that the maximum processing power of a microchip at a given price doubles roughly every 18 months.

Gilder's Law - the total bandwidth of communication systems will triple every 12 months - describes a similar decline in the unit cost of the net.

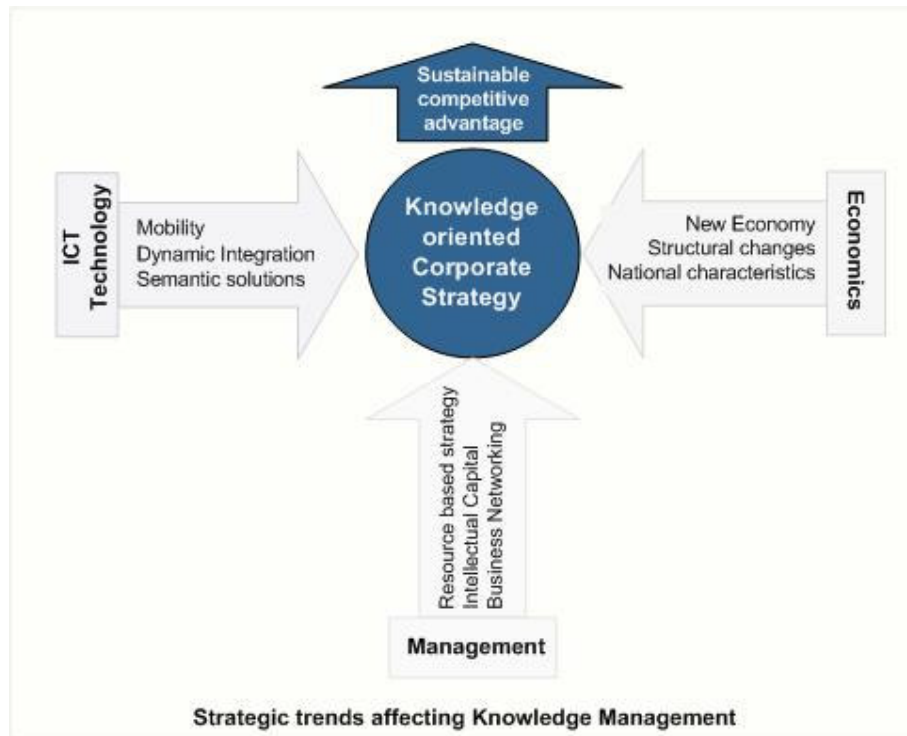
Metcalfe's Law holds that the value of a network is proportional to the square of the number of nodes.

Therefore, as a network grows, the value of being connected to it grows exponentially, while the cost per user remains the same or even reduces.

⁶ Berners-Lee, T. Weaving the Web, Orion Business Books, 1999

Knowledge oriented Strategy KoS

A summary of the main points raised is shown diagrammatically in the following diagram pointing to the need for Knowledge oriented Strategies (KoS).



Despite the increased understanding of the importance of dynamic knowledge capabilities in strategy, and advances in knowledge management technologies, one area still seriously underdeveloped is the ability to link Knowledge Management with strategy and competitive advantage. To establish a **Knowledge oriented Strategy** we must understand and articulate the advantage that comes from knowledge as a strategic resource enabling the company to better formulate and execute its competitive strategy. For this a knowledge view of the organisation must be created and used to define its knowledge oriented competitive positioning in the specific sector in which it operates. This knowledge view of a company defines a particular type of **context** that links strategy and Knowledge Management technologies.

First, **Knowledge oriented Strategy** formulation should take into account the Resource Based Perspective and Intellectual Capital approaches. The strategy itself will then seek opportunities in an environment shaped by the broader New Economy trends and the ICT developments outlined earlier.

The crucial ICT developments are increased mobility and semantic solutions. The resultant outcome is an increased range of services delivered 'through everything everywhere'.

Personalised services about health, goods, travelling, and education are likely to be accessible through mobiles and television channels, customised to individual profiles. Cars, televisions, washing machines and all electronic equipment are likely to be more intelligent and therefore more autonomous. Ultimately, goods will know where they should be transported to, how to fix problems with their functionality and how to dispose of themselves in an environmentally friendly way. The choice for consumers is likely to increase drastically and the resulting customer driven economy will increase the difficulties companies have to maintain good performance. As the dynamics of the competitive environment increase so do the difficulties in creating conditions that support sustainable advantage.

Turning back to what constitutes strategic knowledge; a starting point is what a company can do to succeed in a highly uncertain and dynamic market place. A common element of competitive strategy is increased speed of understanding of customer perceptions and trends and increased ability to respond faster than the competition to competitive challenges. In this case strategic knowledge should help the company to act faster. The question is what is the strategic knowledge that will enable the company to better formulate and execute its 'fast adaptation' competitive strategy?

Would a company be more competitive if it increased its knowledge about its customers? The answer is there would probably be some performance improvement but clearly it is not the solution. Apart from good customer knowledge, the company needs **a capability to generate new knowledge to explain changes in customer patterns and to create successful responses. It needs dynamic capabilities** for "adapting, integrating, and re-configuring internal and external organizational skills, resources and functional competencies towards a changing environment"- **this is what represents a strategic knowledge management capability.**

A strategic knowledge management capability should facilitate early recognition of change patterns of from which possible explanations and therefore possible expected change trajectories can be made and then monitored. The key is to understand the change reasons in order to design appropriate responses taking into account the organisational constraints and optimising time and cost.

We need therefore to understand better the change patterns to define **context** that activates knowledge and knowledge development.

We need increased automation of knowledge extraction based on such **change context**. In most cases the change context should also initiate **learning cycles** aimed at the creation of **adaptation knowledge** that will support the development of the response. At this stage the use of learning ontologies will provide a crucial tool in this area.

Strategic Knowledge Management Capabilities

A strategic knowledge management capability enables an organisation to combine its knowledge on markets and products with change adaptation knowledge to gain sustainable competitive advantage.

The key requirement for strategic knowledge management capabilities is the **synergetic development of strategy, knowledge dynamics and semantic based technologies.**

This is represented by a Strategic Knowledge Management approach as shown in the following diagram.



Strategic Knowledge Management is based on establishing a Strategic Knowledge Management framework that defines all the key elements of Knowledge Management and their interaction with business strategy, organisational design and business processes. Such a framework should guide the specification of knowledge dynamics (knowledge units, degrees of freedom, clustering, transfer, mediation, learning, momentum) as well as knowledge value and knowledge development models. **The Strategic Knowledge Management Framework should create a knowledge view of the organisation and use knowledge dimensions as the basis for its competitive position in a specific industry.** Technology and business models can then be combined to produce strategic knowledge management capabilities that will deliver sustainable advantage.

Summary

We define strategic knowledge management as the development of an organisational-wide knowledge management capability designed to provide sustainable competitive advantage.

The 'knowledge economy' and the 'information society' have become the recognised cornerstones of the developed economies as the balance between knowledge and other resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining the standard of living in knowledge economies and the competitiveness of companies. There is considerable evidence that the intangible component of the value of high technology and service companies far outweighs the tangible value of its physical assets. According to New Growth economics a country's capacity to take advantage of the knowledge economy depends on how quickly it can become a "learning economy". In the "learning economy" individuals, firms, and countries create wealth in proportion to their capacity to learn and share innovations.

The Resource Based Perspective of strategy highlights that companies have differentiated resources, capabilities, and endowments and has created an understanding of strategy formulation addressing intangible resources. One of the principal insights of the Resource Based Perspective is that company resources are not of equal importance or possess the potential to be a source of sustainable competitive advantage. Much attention has focused therefore, on the characteristics of **advantage-creating resources**, which possess barriers to both imitation and mobility.

The Resource Based Perspective of corporate strategy advocates the leveraging of resources and capabilities in many products for different markets rather than focusing on specific products targeting specific market segments. Competitive advantage can then be attained primarily through **knowledge driven dynamic capabilities**, which possess barriers to both imitation and mobility.

The term 'dynamic' refers to strategic responses required when time-to-market and timing is critical, the pace of innovation is accelerating and the nature of future competition and markets is uncertain. **Knowledge oriented dynamic capabilities** support adaptation to the changing environment through knowledge driven reconfiguration, integration and innovation of organisational competencies. Consequently, knowledge oriented dynamic capabilities provide the basis for **strategic knowledge management** enabling companies to combine their knowledge on markets and products with **change adaptation knowledge** to gain sustainable competitive advantage.