

From Value Chain to Value Network: Insights for Mobile Operators

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ABSTRACT

The concept of a value chain has assumed a dominant position in the strategic analysis of industries. However, the value chain is underpinned by a particular value creating logic and its application results in particular strategic postures. Adopting a network perspective provides an alternative perspective that is more suited to New Economy organisations, particularly for those where both the product and supply and demand chain is digitized. This paper introduces the value network concept and illuminates on its value creating logic. It introduces Network Value Analysis (NVA) as a way to analyse competitive ecosystems. To illustrate its application, the provision of mobile services and content is explored to identify potential strategic implications for mobile operators.

Keywords: Value Chain, Value Network, Strategy, Telecommunications, Mobile Operators

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With growth in voice traffic levelling off mobile service providers like O2, T-Mobile, Orange, TIM, France Telecom, Telefonica and Vodafone must look to other means to increase the volume of traffic through their networks to grow revenues. This can be achieved by either increasing customer numbers (assuming average revenues per customers (ARPU) does not decline) or through increasing the usage that existing customers' make of their mobile devices. The former is becoming increasingly difficult as penetration rates for mobile phones reach saturation.¹ While attracting customer from competing operators is a possibility, competitors too are looking to attract customers in a similar fashion, and the practice eventually becoming a zero-sum game. The latter will require enticing subscribers to make greater use of their mobile device through availing of content and services in addition to voice. These so called 'data services' are seen as where the potential for growth lies. However, the nature of these services as well as winning business models is still open to speculation. And, of course, incumbents will not have it all their own way with new entrants and mobile virtual networks operators (MVNOs) likely to provide stiff competition. New technologies like Wi-Fi², WiMax³, IMS⁴ and broadcasting technologies will also have a disruptive impact on the current ecosystem for mobile operators and mobile service providers.

The Internet has shown the way to commercialise digital content and in the provision of services. However, despite the existence of WAP⁵, most access to the Internet is still through either fixed lines or wireless WiFi hotspots. In the future, handheld mobile devices connected to telecommunications networks are predicted to become a critical way to gain access to the increasing amounts of content now in digital format as well as avail of services and applications. What is becoming clear is that mobile operators are unlikely to develop and manage all these services. Content and services are likely to be provided by a myriad of third party organisations ranging from the large media conglomerates such as Disney, NBC and Sony to global and regional banks to smaller "cottage" industry companies like iTouch, Index, Monsternob, Zed and Jamba.

Mobile operators are today in a key position as they "own" the mobile delivery channel as well as relationships with customers. This monopolistic position however can also make them complacent. It similarly can stifle strategic thinking and innovation. Of course, mobile operators don't want to end up like Internet service providers (ISPs); while providing the access point to the fixed Internet many have been unable to appropriate the value that is proportional to their privileged position. Only a small percentage of ISPs are profitable today, a situation defined by the fact that: barriers to entry are low, the cost of acquiring customers is high, switching costs

are low, competition is based on price, and in most cases ISP's don't have any relationship with their customers. To reap rewards, operators must maintain their current privileged position yet provoke innovation in the kind of products and services that will create value for customers and thus lead to continued revenue growth.

To maintain this position, operators have sought to develop "walled garden" portals to ensure that content creators are kept well away from end-customers. This strategy has made it difficult for content providers to easily connect up to operator networks in order to make their content available and those that do are also unhappy with the revenue-sharing arrangements.⁶ This practice is based on the old conception of the value chain with its value creating logic as a linked chain of activities, a perspective that leads to the development of strategies focused on controlling the chain. Indeed, fixed wireline operators owned the entire value chain. With the digitisation of both content and the value chain this logic is inappropriate and requires a fresh perspective that recognises co-operative relationships and alliances. Mobile telecom operators must also redraw their IT architecture if they hope to market new services quickly and cheaply.⁷ Many have begun to implement service delivery platforms (SDPs) to facilitate the provision of new and innovative content from 3rd party providers, however the overall logic guiding these initiatives is based on old conceptions of value creation and the value chain logic. This raises the issue of developing software frameworks to assist the establishment of inter-organizational relationships where the focus is not just on facilitating data exchange but also different business models and bilateral service level agreements.

This paper offers an alternative perspective on how managers can shape strategy and devise business models in order to capture and leverage opportunities in digital competitive spaces. In particular, it focuses on the provision of innovative content and services to customers through mobile devices. After a brief introduction to the mobile content and services ecosystems it highlights the challenging of leveraging value through the transmission network. The value network concept is then introduced and the process of network value analysis (NVA) is described. The provision of innovative mobile content and services is then explored using value network analysis and some implication for mobile service operators and mobile service providers developed. The paper concludes by exploring the implication of the value network logic for the development of software systems for the networked economy.

Evolution of the mobile services ecosystem

The mobile ecosystem (the development and provision of voice and data services) is relatively new.⁸ The technical foundation for the current mobile data transmission system was laid down in the early 1990s, with the introduction of GSM⁹ as a standard in many parts of the world.¹⁰ With GSM networks customers pay for the time connected rather than the amount of data transferred. Newer networks based on GPRS¹¹ technology are package switched, which means that users are constantly connected but only pay for the amount of data transmitted. The transition to GPRS from GSM is possible with fairly limited investment, no more than an upgrading of the network. UMTS¹², or 3G, offers improved speeds as well as more efficient use of frequency space. However, it requires new investment and deployment of new technical infrastructures.

The mobile phone is now more than just a functional piece of technology to connect up to mobile transmission networks. It doesn't merely replace the land line: it is a fashion item that has become an indispensable device for managing emails to contacts to diaries. It also provides the access capability for many different types of content and services, such as financial transactions, entertainment, and gambling. In the business-to-business (B2B) domain, it can provide access to corporate applications, such as customer relationship management and task scheduling. Personalisation, communication, positioning and immediacy are the cornerstone of the mobile marketplace for consumers.¹³ With handset positioning capability, for example, customers can get answer to questions such as "Where is the nearest restaurant?" or "How do I get to the main train station?"¹⁴

Over last decades, deregulation, internationalisation and technology innovation have dramatically changed the face of the European telecommunications industry.¹⁵ To cope with these powerful forces, incumbent telecommunication operators have had to strategically renew their companies and develop new competencies, particularly to compete with mobile services. These shifts also demand a change in managerial mindsets. For the tradition telecom operator (PTT) this transition has not been easy and many have struggled; Figure 1 captures the transition that has been necessary across a number of key dimensions.

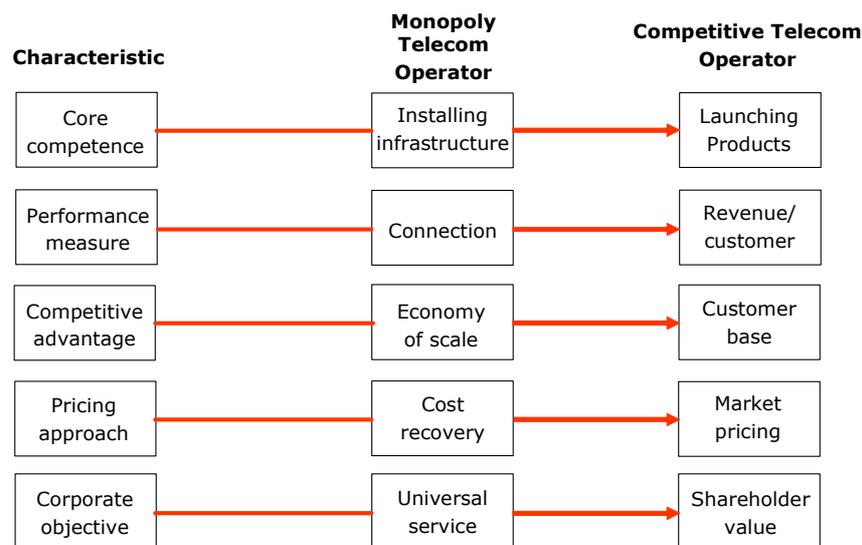


FIGURE 1 From monopoly to competition: challenges facing traditional telecom operators as they enter mobile space.

From the exuberance of youth, the mobile industry is now showing signs of maturing. Figure 2 presents the major shifts that this maturation has caused among incumbent operators. Service providers no longer look on customers as engaging in transactions, generating revenue through network usage. Even the word "subscriber" has connotations of subscribing to use the transmission network, and has its legacy in fixed wire-line voice services. Service providers now seek to develop closer relationships with their customer base. The early practice among operators was to push services at customers. Today, the focus is on better understanding customers and their preferences, and segmenting the customer base, focusing on providing differentiating offerings. Indeed, in the early days, network operators competed with

each other to attract customers; the value of the network increases with number of customers.¹⁶ Today, the focus is on customer retention. Indeed, average revenue per user (ARPU), a key metric in the early days has been replaced by average profit per user (APU). At the origins of the industry, operators focused on investing in infrastructure, building and rolling out transmission networks and broadening coverage. The key today is to leverage key assets, such as billing, messaging, location, presence, etc. And, just when operators were considering 3G TV and video services, phones with television receivers that let broadcasters bypass mobile networks and transmit programs straight to handsets have begun to appear.¹⁷

One key shift is that from a focus on technology, particular stressing the advantages of digital over analogue, to content and services. It is the take-up of these services that will drive network traffic. Yet, incumbent operators equally recognise that in the future significant value will not be created through the transmission of digital ‘bits’. Indeed, it has been said that transporting bits is an even worse business to be in than that of airlines with their fare wars!¹⁸ The cost of sending data across a network is based on the amount transmitted not connection time or distance. Value, rather than pure cost is what is important and should be a key driver in the construction of any competitive strategy.

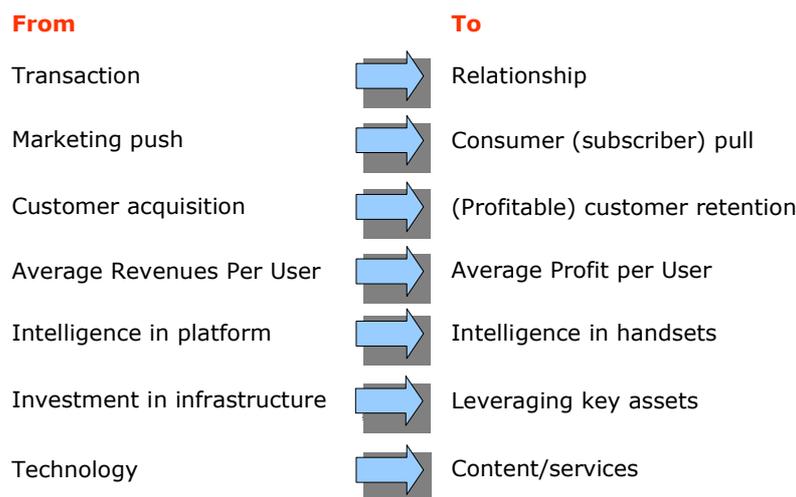


FIGURE 2 Shifts in the attitude of mobile service providers.

With traditional networks in organisations (such as LANs and WANs) the cost of using the network is based on *capacity* not *volume* of data transmitted. However, where data is delivered over a wireless connection, every bit of data transmitted has a cost. So a financial trader will value the timely collection of bits describing a market movement far more highly than a multiple megabit picture. Since wireless spectrum resources are limited and more precious than cables or fibre in the ground, mobile operators have to manage the cost of each bit transmitted versus the revenue gained. If an operator is just a ‘bit pipe’ utility provider, delivering and charging for simple raw data, this places a greater onus on the user to manage their use of the actual services carried.

The traditional mobile service provider, while also the operator of the network transmission infrastructure through ownership of the licence spectrum, may not necessarily be so in the future. We have already seen the emergence of MVNO

(mobile virtual network operators) like Virgin and Tele-2 purchase bandwidth from T-Mobile and Telenor respectively and sell on network access to customers under their own brand as well as provide a portal to other content and services. This practice provides new delivery channels for leveraging brands of non-telecommunications organisations, enabling relationships with their customers to be enhanced. We have also witnessed a new type of service provider utilising the services of mobile virtual network enablers (MVNE), facilitating these providers to deliver services without any telecoms operational expertise.

The challenge of combining IT, data and applications with mobile access creates a service delivery opportunity; integrating the commercial considerations of customer service levels, multiple provider billing and international relationships with the technology challenges of complex data over transient connections. This moves the argument from one of the cost of supplying a commodity to one of value, service delivery and solution provision.

From value chain to value network

The value chain as both a concept and tool has been used for the last 30 years to understand and analyse industries.¹⁹ It has proved a very useful mechanism for portraying the chained linkage of activities that exist in the physical world within traditional industries, particularly manufacturing. Furthermore, it has also framed our thinking about value and value creation. However, as products and services become dematerialised and the value chain itself no longer having a physical dimension, the value chain concept becomes in an inappropriate device with which to analyse many industries today and uncover sources of value.²⁰ This is particularly evident in sectors such as banking, insurance, telecommunications, news, entertainment, music, advertising, and certain areas of the public sector.²¹ In addition, many industries now exhibit strong co-operative behaviour²² with inter-firm relationships playing a significant role in strategic performance.²³ The focal of the value chain is the end product and the chain is designed around the activities required to produce it. The logic being that every company occupies a position in the chain; upstream suppliers provide inputs before passing them downstream to the next link in the chain, the customer. With the value network concept, value is co-created by a combination of players in the network.

The competitive realities of the “network economy” require that we rethink traditional methods for analysing competitive environments. The old linear models do not account for the nature of alliances, competitors, complementors and other members in business networks. Traditionally, strategists use the value chain to analyse the firm and its major competitors and to identify gaps between firm performance and a competitor’s performance. Once the gaps are known, the strategist can make and implement plans to close them. This is a valuable exercise, particularly in the ‘physical’ world typified by manufacturing firms. Strategy becomes primarily the art of positioning a firm in the right place on the value chain.²⁴ Figure 3 illustrates a value chain perspective of the mobile network operator.

Adopting a contrasting *network* approach, organisations focus not on the company or the industry, but the value-creating system itself, within which different economic

actors – supplier, partners, allies, and customers – work together to *co-produce* value. Where once individual firm battled against each other, today the war is waged between networks of interconnected organisations. Leaders must view the health and well being of their network and the individual partners that compose it to be as important as their own company's.²⁵

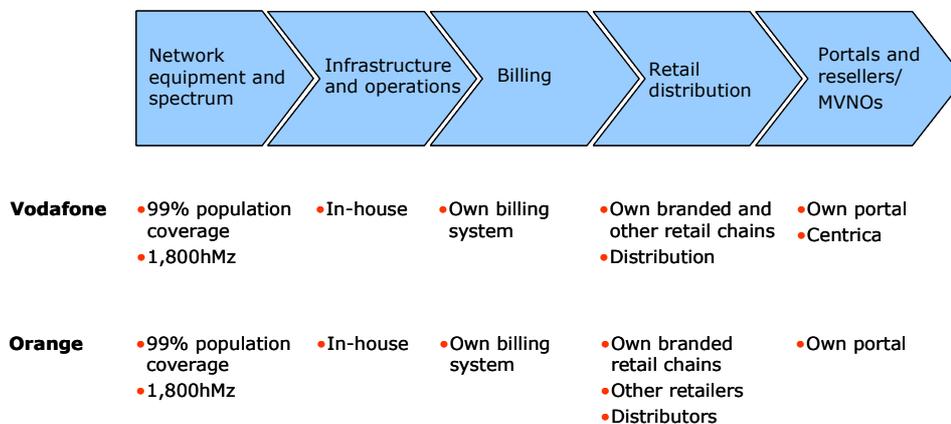


FIGURE 3 The traditional industry value chain view of the mobile network operator: Vodafone and Orange.

Value networks are composed of complementary node and links.²⁶ The crucial defining feature of networks is the complementarity between the various nodes and links. A service delivered over a network requires the use of two or more network components. Think of value networks as a set of relatively autonomous units that can be managed independently, but operate together in a framework of common principles and service level agreements (SLAs). Firms in the network are independent; otherwise they would fall into a case of ‘vertical quasi-integration’.²⁷ However, the relationships enjoyed by the firms in the network are essential to their competitive positions. The structure of the network plays an important role in firm performance and in industry evolution.²⁸

Transaction cost analysis²⁹ provides a way of understanding the impact of new information and communication technologies and why transformations take place within industries. According to this theory, an organisation has two options for organising its activities: an internal *hierarchical* structure that integrates activities into its managerial structure, or a *market* relationship with external firms.³⁰ Market transactions support coordination between multiple buyers and sellers, and hierarchical transactions that support coordination within the firm.³¹ Digitisation is significantly altering the cost structure of firms such that the cost of transactions, both within and between organisations, is dramatically declining.³² Thus, many of the benefits associated with integrated firms (i.e. hierarchy), which primarily arise from their lower transaction costs, are eliminated. This can be seen right across traditional industries with fragmentation of traditional value chains from banking to automotive manufacturing.³³ It is also leading to the emergence of the so called virtual organisation.³⁴

Analysis suggests that the present integrated mobile telecommunications company is not sustainable and that companies may need to deconstruct around one of three

functions, unless clear strategic benefits can be identified and pursued by keeping these functions within the same organisation.³⁵

- *Customer relationship business*, where competitive advantages come from economies of scope, with each customer treated as an individual.
- *Service and content innovation and commercialisation businesses*, where the focus is on new innovations and on the speed-to-market for new content and services.
- *Infrastructure management businesses*, providing network access and mediating capability, where economies of scale dominate the management philosophy.

In contrast to the value chain logic, these functions are performed simultaneous rather than sequentially, and mutual adjustments are required with respect to network scope, capacity and the technical properties of the concurrent services.³⁶

Currently, most mobile operators, particularly the main players, manage these functions under the same organisational roof. But this can have implications, for example, the ability to offer innovative products to customers may be limited by the underlying technological characteristics of the core network or by the need to avoid cannibalising the organisation's own sales in other divisions.³⁷ The separation of the three functions is beginning to be seen in the industry, for example MVNOs focusing on managing a brand's relationship with the customer.³⁸

While integrated companies do have many long term strategic advantages³⁹, over time the specialised, focused and relatively 'simple' organisation that emerge from this deconstruction will not remain static. Instead, these companies will become more complex as they develop expertise in other areas, albeit on a smaller scale than previously, and with different emphasis as well. An infrastructure provider will, for example, require expertise in customer management, as well as product innovation and commercialisation to identify, establish, and then manage the new business relationships that it establishes. However, potential conflicts will again emerge between different functions. The grouping of expertise within organisations will not be the same as before; it will differ depending on what part of the telecommunications industry the organisation is located in, and the business model it has chosen to develop. This fragmentation results in a radical deconstruction of the industry where complex relationships will need to be formed between different players in order to deliver services to end customers. These can be represented by a network of connected entities: the value network.

In analysing a network as opposed to a chain, we are essentially asking the same question as with value chain analysis: "How is value created?" The traditional answer to this question is "Through the value chain". However, in the networked economy as firms move increasingly to a virtual marketpace⁴⁰, traditional analytical tools fail to identify the true sources of value. The key to value creation in the networked economy lies in understanding *how* value is created in relationships.⁴¹ From a network perspective relationships are viewed as part of a larger whole – a network of interdependent relationships.⁴² These relationships are 'connected' since what happens in one relationship affects positively or negatively in others.

We must therefore extend any analysis away from viewing value creation from the perspective of an organisation as an isolated unit to looking at how the organisation creates value within the context of the network. It is this network of relationships that provides the key to understanding the competitive environment in the network economy. Consider Intel developing a new microprocessor. The success of this chip depends on software developers writing applications that leverage the new processing capability; hardware manufacturers must build systems that can accommodate the new chip, including any additional cooling requirements; and new bus architectures may also need to be designed. This ecosystem must be cultivated.

One of the most important aspects of the networked economy is its dynamic nature. An action by one participant in the network can influence other network members. Or an action by one participant may require further actions by other participants to be effective. This can have broad implications. It is no longer enough to think of a firm as a member of a closed system subject to uncontrollable outside shocks. It is actually part of a network that produces its own change. Thus, in analysing the network all aspects of the network must be included: customers, suppliers, competitors, allies, regulators, complementors and any other network players whose presence in the network can influence value creation of the firm.

By understanding a firm's relationships with other network members, strategists can better understand the following:

- Where value lies in the network and how value is co-created
- How the firm's activities will affect the network and
- How other members are likely to respond.

As a result, analysing a network places all the elements of a network in their proper context and becomes the guiding force for determining how a networked economy business model should be improved or developed. Taking a network view of a mobile operator and rather than merely asking "how can the operator add value to its customers?" we ask "How can the operator add value to the other members of the network?" In so doing, we begin to understand not only the direct relationships between operators and customers, but also the interrelationships between all the other members of the network – a much more complex issue!

Foundations of Network Value Analysis (NVA)

The development of any set of propositions around new business models in the evolving networked economy must be based on underlying theoretical perspectives. Traditionally, linking up businesses to form networks has been the object of numerous investigations in the fields of economics, sociology and informatics.⁴³ These investigations describe network phenomena as very abstract approaches to network classification and structure.⁴⁴ However, neither transaction cost theory⁴⁵, network theory⁴⁶, network economics⁴⁷ nor any other of the theories examined provide support in answering practical questions with strategy formulation.

From our research, we have developed an approach that we call Network Value Analysis (NVA). With NVA, the aim is to generate a comprehensive description of

where value lies in a network and how value is created. Box 1 illustrates the stages in undertaking such an analysis. The first step involves defining the network objectives and setting the boundaries of the analysis. We can conceive a network as an imaginary construct invented to connect together a set of relationships between entities where linkages (e.g. interactions, influences and relationships) already exist. Using this perspective, networks are essentially mental constructions of what we “see” connected in reality.

The network should contain roles or functions as nodes not specific organisation names. Organisational boundaries can subsequently be constructed around these functions. For example, in constructing the network for the mobile content and services ecosystem, we have separate nodes for transmission network operation and service provision and not specify particular organisations such as Vodafone, TIM or 02. With

MVNOs, for example, we have a breed of service provider now providing voice and data services but not operating their own transmission network.

Box 1. Network Value Analysis

1. Define the network
2. Identify and define network entities
3. Define the value each entity perceives from being a network member.
4. Identify and map network influences.
5. Analyse and shape.

Through analysis of the network, it aids in addressing the issues faced when designing strategy. These include:

- What roles (or groups of players) are benefiting most in the new configuration?
 - Multiple new roles
 - Roles differ depending on service
 - Roles likely to be disaggregated
 - Roles could be played by multiple players within a single offering
- Different business logics for different players (depending on their roles in the new network)
 - What are the key resources they need to have?
 - What are the key activities they need to do?
 - What are the key cost and value drivers?
- Different players require different business logic
 - Where are you best placed to play?
 - What are your key strengths and how can they be leveraged in this new space?
 - Where will competitors have advantages over you?
- New business models

- Could you build the resources and capabilities required to compete in the chosen role?
- Which ones are appropriate for each player?

Step 1: Define network objectives.

With NVA, the aim is to generate a comprehensive description of where value lies in a network. The first step involves defining the network or setting the boundaries of analysis. This will be from the perspective of the network focal. The network focal is the organisation or business unit (economic units such as corporations, divisions profit centres, and small and medium sized enterprises) whose business model relies on the network under consideration.

Step 2: Identifying and defining network participants

Identifying network participants requires taking the standpoint of the *network focal* and identifying all actors that *influence* the value the network focal delivers its end-customers. We can define the network as consisting of all those actors or communities of people that exist in the network focal's current network environment that have a *direct influence on, or are affected by*, its value propositions towards customers. Depending on the network objectives, these can include designers, suppliers, competitors, channels, regulators, technology vendors, and software suppliers.

Step 3: Identifying value dimensions of the network participants

Delivering value requires a clear understanding of exactly what kind of value is desired by network members. Simply, value is as they perceive it, so every organisation must find ways to draw out from network members how they see value – now and in the future. This is why planning a value delivery strategy by “identifying the value” for all participants is so important.⁴⁸ The objective is to capture the perceived value of the different participants in regard to being part of the extended network.

Perceived value concerns implicit beliefs that guide behaviour⁴⁹ and this step involves investigating why members are part of the network. It is worth mentioning here that although we tend to refer to perceived value in a positive sense (e.g. the entertainment pleasure a user perceives through Internet gaming) this step also involves capturing the perceived inconveniences (or *detriments*) the participants perceive due to being part of the extended network (participants can be both voluntarily and involuntarily involved in the network). In a way, these detriments can be thought of as negative value dimensions as they destroy/reduce value for the participant. Although simple in concept, the mere recognition that the perceived benefits (and perceived inconveniences or detriments) of network members diverge is an important step toward the network focal ‘managing’ the participants as it is identifying and classifying those benefits and detriments.

Identifying the value dimensions of the network participants involves asking, “What are they getting out of the network?” As opposed to traditional activity analyses of firms and behavioural analyses concerning individuals, investigating the perceived positive and negative value dimensions of network participants proves to be more advantageous when studying opportunity networks. *Opportunity networks* represent emerging networks – no one knows what they will look like in the future. The only way to analyse them is to assess the forces that are shaping such networks. Perceived value is a key driver of behaviour which in turn is a key force of network development. In a way, perceived values envisage a network member’s highest level of steering toward influencing network development – it is the perceived values that steer what people and firms are willing to do and not do.

Step 4: Define value linkages

This step involves identifying the nature of linkages between the members of the extended network. As linkages between members can take several forms (e.g. financial control, affection, dependency for content etc.) we only consider those that feed the value dimensions identified for all network participants in the previous step. More specifically, we call these linkages network *influences*. Identifying network influences is important for NVA, as the level of influence is an important indicator of the amount of attention providers will need to give to that network participant when developing its business model.

A network influence is any linkage that influences or impacts the perceived value dimensions and/or behaviour of a network participant. Influences on a network participant’s behaviour are included in the analysis as behaviour is very closely related (and dependent) on the value a participant perceives from the network. As a guide, suffice it is to say that perceived value concerns implicit beliefs and it is these beliefs that guide behaviour.

Influences are a manifestation of linkages between network members and concern what flows in the network – that is, what is carried or exchanged in the network. The different types of influences can be categorized as follows:⁵⁰

- (1) Exchange of goods and services; for example, new content.
- (2) Affective and liking (expressive/emotional); for example, customers attracted to a brand.
- (3) Information and ideas (cognitive); for example, ideas for new service offerings coming from customers, content developers or market research companies.
- (4) Influence and power (prescriptive); for example, regulators.

Network influences can be *direct* or *indirect* depending on whose perspective one takes. With NVA, we take the perspective of the network focal with respect to its objectives and offerings towards its customers. Only those influences that have an explicit affect on their business are considered.

Influences can be positive or negative with respect to the value dimensions and/or behaviour of the participant that is affected. Perceptions are used, as whether real or imaginary is not the issue as long as it is perceived to be a threat it has a negative

influence with respect to their value dimensions. An influence can be considered as network critical if (a) the provider network currently depends on this linkage to create value for the users and/or (b) the influence can alter the current network significantly if no action is undertaken in respect of this influence.

Step 5: Analyse and shape

The network value map provides an overview of the network and thus allows some quick conclusions to be drawn as it relates to the roles of the different participants in the network and analyse scenarios in terms of effects on the network of discrete events. The key to this analysis is a thorough understanding of the value dimensions of all participants and how they are influenced by other participants. End customers are typically the key to value creation in this network.

A map is by definition static – a snap shot in time – whereas the environment, and in particular in a network, is dynamic. In addition to the analysis of the static map, we therefore need to add another layer of analysis examining the behaviour of the network. This entails describing some relevant network effects and features of different types of networks. Any analysis typically covers the following:

- Identification of the different roles of the participants in the network
- Analysis of the value dimensions of the users
- Analysis of the network dynamics in play and their implications in future scenarios
- Challenges that can be extracted from the analysis.

Mobile content/service innovation and provision

To illustrate network value analysis, we shall examine mobile content and service innovation and its provisioning to customers. It is widely established that content and services will be the drivers of traffic through operator transmission networks. It is also acknowledged that operators themselves will not develop all of these services but that they will be provided by third-party providers. Some of these will be large conglomerate media organisations; others will be smaller start-ups companies or aggregators. The “walled-garden” approaches, where only content from selected providers is made available from an operator portal is acknowledged as being no longer appropriate: customers want choice. This has implications for operators and their competitive behaviour.

Thus, network participants include MVNO, network operators, content aggregators, content/service creators, browsers developers, infrastructure equipment, marketing companies, regulators, etc.

Currently, the process to physically connect up new 3rd parties content and service creators takes up considerable time and can be a costly exercise. Often connecting up each creator or aggregator is a significant systems integration project. Initial negotiations, agreeing business model and defining appropriate service level agreement all take time, and operators could potentially have 1000's of content

providers. Consequently, the time-to-market for new services is such that commercial opportunities can be lost due to long lead times; many services can have short lifecycles, for example, content based around a new movie or a marketing campaign for a consumer product. For the operator, the cost of 3rd party management can be overly complex and excessive.

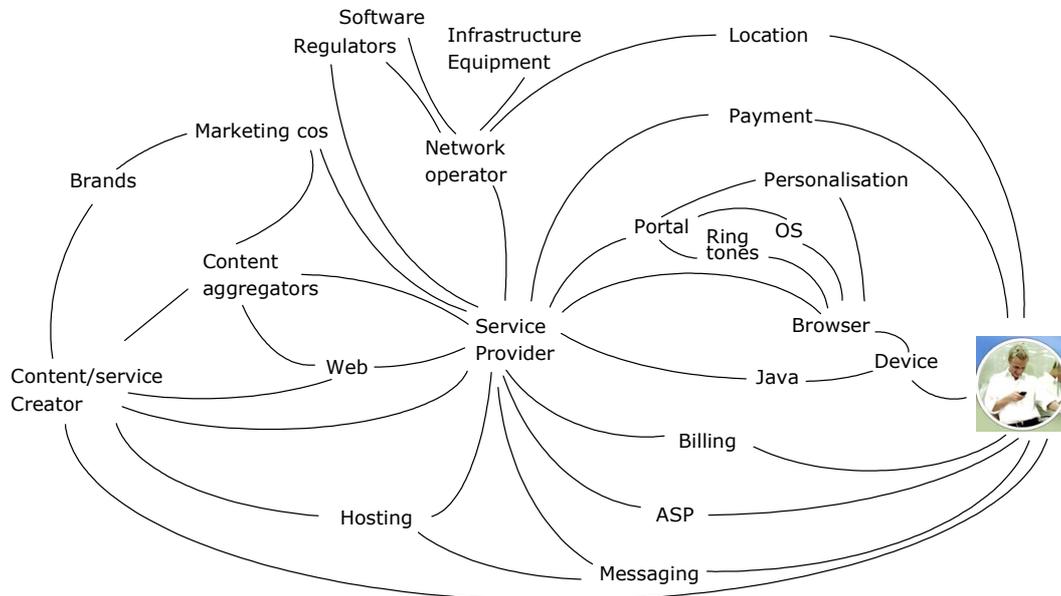


FIGURE 4 Partial network value map for mobile content.

Figure 5 illustrates schematically the network relationship between content and service creators and a network operator. It outlines what the 3rd party provider is seeking from the relationship, and thus membership of the overall network. These include a process that facilitates easy sign-up and negotiation, easier connection to physical network, quick time to market for their offerings, more control over service lifecycle and quick settlement. The operator also has particular requirements driven by their need to offer customers a broader service portfolio: seeking low risk so that their brand is not compromised, greater control over network assets, shorter time to enrol new third parties, robust business processes and support for different business models and revenue distribution schemes.

We cannot forget the customer from analysis as the customer ultimately defines value. As a member of the network, the customer is not interested in the complexity of the IT systems or transmission network. Equally, customers do not want to be concerned with the revenue sharing agreement between content provider and network operator. The customer is seeking choice, service quality, relevance, ease of use, fair and easily understood pricing as well as good support, if required.

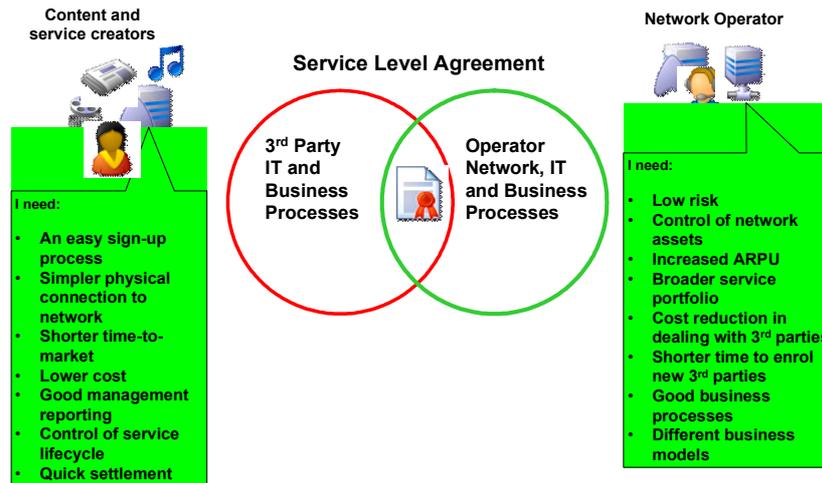


FIGURE 5 Business drivers for service level agreements (SLAs) between Operator and content and service providers (*Source: Mobile Cohesion, 2005*).

Reducing the time-to-market for new content and services has significant benefits for both the creator and the operator (see Figure 6). Content becomes profitable within a shorter space of time. Short lifespan services, such as those associated with particular brand promotions, also become economically feasible. For the marketers, it now permits more granular segmentation of the market, with content focused on the particular demographic of the customer. This enables operators to increase its content and services portfolio, thereby driving revenue growth.

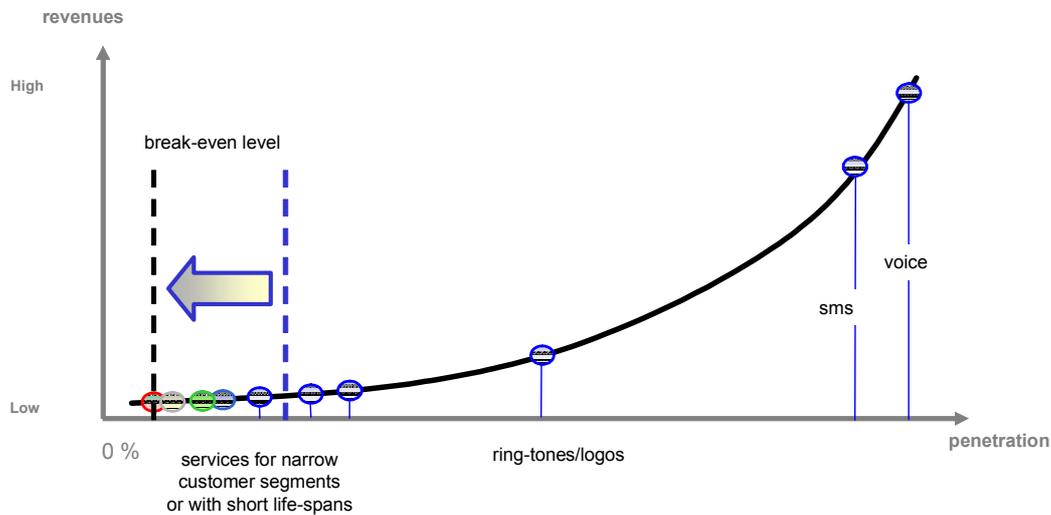


FIGURE 6 Pushing back the breakeven point: more services, more customers, more revenue.

This figure also illustrates the theory of the Long Tail. This emerging thesis asserts that if customers have infinite choice, they will gravitate towards niches because they satisfy narrow interests better.⁵¹ We are already witnessing this phenomenon in areas such as music and book retailing. For example, more than half of Amazon’s book sales come from outside its top 130,000 titles; this is more than most bookstores will typically stock in a physical book store.⁵² Rhapsody streams more songs each month beyond its top 10,000 than it does its top 10,000.

The key factor that determines whether a sales distribution has a long tail is the total cost of inventory storage and distribution; when insignificant, as it is with digital services and distribution channel, it becomes economically viable to target many small market segments. This might be content specifically for a football team, a company, or a school. Services and content that may have low volumes can collectively make up a market share that rivals or exceeds the relatively few 'big hits' if distribution channel is large enough.

Insights for mobile operators

So what insights can we glean from analysing the mobile content and service ecosystem from a network perspective? What is clear is that operators cannot expect to go it alone if they are to provide the kind of content and range of services that customers will increasingly demand. They will be forced to cooperate and partner with a range of content and service providers from the large media conglomerates and aggregators to smaller content creators. This requires that network operators embrace the value network concept and its implications.

Driven by the value chain logic, the large European and US mobile operators have focussed on "content ownership" or deployed "content control" strategies. They also work with a small number of content owners and aggregators. The Long Tail thesis, however, means that the stranglehold of the big content providers over operators and service providers can be diminished. These content providers typically provide the "big hits" for distribution. However, by making available a wide variety of content from many different sources can be very profitable. Operators must shift their thinking from viewing connection to customers as a "dumb pipe" to a "smart pipe" in order to protect their privileged position on the value network and remain relevant. This entails brokering out their key assets such as search, personalisation, device management, and sophisticated charging to developers of content.

As value is ultimately defined by the customer, operators must base offerings around the notion of value. They must move away from viewing the customer as "my customer" to adopting a perspective of the customer as that which the network seeks to satisfy. This will demand significant mindset shifts in operator organizations that have traditionally guarded closely their customers. Focusing exclusively on the next node in a value network can similarly be a mistake. Value networks are not collections of partners delivering value to one other, based on requirements of next in line.

Operators must explore new revenue sharing models. As one content provider recently noted "[w]e find the standard 85%:15% revenue split for i-mode much more reasonable than the 60% we get from Vodafone live! Ironically, i-mode provider KPN not only gives us more money than Vodafone does, but it also excels in technical and marketing support."⁵³ Those with more favourable models will attract more content creators and thus increase the number of customers ultimately using the network.

Inter-firm relationships facilitate the flow of knowledge and other resources throughout the network. For example, this knowledge can be from customers

providing information about their preferences or from content creators, perhaps a media organisation about to launch a new movie. This flow of knowledge is crucial for the sustainability of a network. For example, one European content provider recently noted “[w]e keep asking operators for more feedback on usage. But they are bad at data mining and would rather keep the little information they have to themselves. Why can’t they understand that we need this data to improve products?”⁵⁴

Of course, content and services that fail to meet the operator designated SLAs could have a detrimental effect on the brand of the operator. For example, news services delivering news late to customers or poor graphical presentation of a game can be perceived as the fault of the network operator. Operators must therefore continually monitor the performance of providers using their network as well as the quality of services being delivered.

Networks do not remain stable but evolve over time. This evolution can be the result of particular events, for example competitor strategies, new technologies or regulatory events, which change the structure and configuration of a network. Consider the impact that Skype and Google are likely to have on the fixed-line voice transmission business. Using Voice over Internet Protocol (VoIP) technology, both have not only become members of this network but challenge the dominant position of traditional national Telcos. WiMax, IMS and satellite technologies are poised to challenge the 3G transmission networks of incumbent operators as are broadcasting companies and handset manufacturers.

Value networks and inter-organizational systems

The value network logic raises particular issues for the development of systems supporting inter-organisational relationships. Traditionally technologies like electronic data interchange (EDI) and more recently the Internet (via electronic marketplaces) have been used to facilitate connectivity and integration of data and information from partner organisations using agreed standards. While the content or service of the third-party can be embodied in an electronic form, other aspects of the relationship are still conducted on a personal basis.

Most software today is designed based on value chain logic. This means that even if two companies seek to collaborate, with both using software from the same vendor, it is still considered a major systems integration (SI) task to physically and logically connect up systems. In value networks, lengthy SI projects are not a viable option, or indeed appropriate. Furthermore, the focus of new inter-organizational systems should not just be on exchanging information but also for facilitating the establishment of different types of relationships as well as to manage the myriad of third party content providers. For example, it is likely that operators will establish different service levels with different content providers. It is also possible that different business models will underpin each of these relationships. New software systems must facilitate all these tasks. Self-service portals to automate the process of collaboration are a likely way forward.

One way is to view the relationship between network parties at five levels: business model, management reporting and administration, business process, service level, and

network. Each level defines a set of terms and conditions (or policy) relating to the different dimensions of a partnership. Technology can support, and often automate, all five levels.

The network level is perhaps best understood and developed and where the focus of attention has been in developing inter-organizational systems. In the mobile ecosystem, this level is concerned with facilitating the transmission of content through the wireless network. New technologies like Internet-based web services⁵⁵ permit operators to leverage the key assets of their physical transmission network. They can expose network capabilities, such as SMS, MMS, presence and location, making them easily available to content and service creators. This helps developers to create content more easily and speedily that takes advantage of the full capability of the operator network.

The traditional “sign-up” process for prospective content providers can be long, complex and expensive. It typically entails initial meetings and presentations, followed by negotiations, perhaps due diligence, and ultimate agreements of business model and service levels. Given the large number of potential content providers an operator may work with this process can be resource intense. However, today, technology can automate most of the process involved in collaboration. One scenario might be that through an operator portal potential providers can register, outline the service they would like to provide to customers and the network resources they would need. After an assessment is made within the operator, a frame agreement can be generated and appropriate service levels established. Third-party providers might, for example, be assigned difference levels of privileges. For example, Blue partners might be tightly constrained and permitted to avail of a very basic service level and access to particular network resources; Platinum partners might have more privileges and be given full access to the network and network assets. The brand of the Blue partner will typically be weaker and less recognizable than that of the operator; poor content from providers within this category could seriously undermine the brand of the operator. The Blue partner may possibly not be permitted to release content onto the operator network unless it is first checked by the operator. For Platinum partners, their brand may be as strong as or stronger than that of the operator and within their service level they may have permission to launch products directly onto the market over the operator network. Indeed, the privileges granted to premium brands may position them closer to an MVNO than a mere content creator.

The service level agreement is essentially the framework within which the business model is operationalized. It defines, among other things, access to transmission network resources (such as SMS, MMS, or presence) and when network resources can be used. The service level essentially determines the extent of trust that exists between operator and third-party provider. The service level will govern such aspects of the service as subscription/provisioning model, billing models, service lifecycle, media and content type. Additionally, an operator may sign a deal with a mapping service or payment service, so rather than all content providers who require these services for their offerings signing separate deals, they can piggy-back on this resource.

Technologies can also facilitate the day-to-day management and administration of the relationship. Speedily reporting customer take-up of services, categories of customer using service are valuable information for content creators. Service quality and usage

can be monitored on an ongoing basis to ensure the optimum service portfolio and facilitate settlement between the operator and content creator.

Conclusion

Mobile content and services is the future: a world where customers will, through a handheld device, transact banking services, make purchases, access news and stories, play games, view videos and TV, gamble, etc. However, it is unlikely that today's mobile operator will be able to develop the types and range of content and services that consumers will increasingly demand. They may not even wish to. A host of different players in the mobile ecosystem are already jockeying for position, including infrastructure, content providers, content aggregators, software developers and device manufacturers. This ecosystem is a set of firms that co-create value. Those who understand the sources of value in the network and are able to exploit them will be the winners.

End Notes

¹ Leading global investment bank Nomura estimate that subscriber growth is slowing and the Western European mobile market crossed the 90% penetration milestone at end of 2004. See *Update of the Wireless Value Chain*, Presentation, London, June 2005, Nomura International Plc. The Arthur D. Little/Exane BNP Paribas report *Mobile Operators: More Effort Required* (Paris, January, 2005) forecast revenue growth in the five largest European countries at 7% in 2005, 4.6% in 2004-07 and 3.3% over 2004-10.

² Wi-Fi is short for Wireless Fidelity and is meant to be used generically when referring to any type of 802.11 network, a family of specifications developments developed by the IEEE (Institute of Electrical and Electronic Engineers). For an assessment of capability of WiFi versus 3G for delivering broadband wireless Internet access services see W. Lehr and L.W. McKnight, 'Wireless Internet access: 3G vs. WiFi?' *Telecommunications Policy*, Vol. 27, 2003, pp. 351-370.

³ Mobile operators generate 80% of revenue from 20% of locations, essentially the main urban areas. WiMax offers a real alternative for subscribers.

⁴ IP Multimedia Subsystems.

⁵ Wireless Application Protocol. This technical capability enables mobile devices using GSM networks to access and browse the Internet.

⁶ M. De Lussanet, *Mobilizing Content for 3G Delivery*, Forrester, London, 2004.

⁷ E. Benni, K. Hjartar and J. Laartz, 'The IT factor in mobile services', *The McKinsey Quarterly*, No. 3, 2003.

⁸ Often referred to as the "mobile wireless value chain", "mobile data services" or "wireless value system". See H.K. Sabat, 'The evolving mobile wireless value chain and market structure', *Telecommunications Policy*, Vol. 26, 2002, pp. 505-535; P. Olla and N.V. Patel, 'A value chain model for mobile data service providers', *Telecommunications Policy*, Vol. 26, 2002, pp. 551-571; and D. Steinbock, 'Globalization of wireless value system: from geographic to strategic advantages', *Telecommunications policy*, Vol. 27, 2003, pp. 207-235.

⁹ Global System for Mobile Communications. The GSM system was originally developed as a European Standard for digital mobile telephony. GSM is now the most widespread mobile system in the world.

¹⁰ This description taken from M. Lindgren, J. Jedbratt and E. Svensson, *Beyond Mobile: People, Communications and Marketing in a Mobilized World*, Palgrave, Basingstoke, Hampshire, 2002.

¹¹ General Packet Radio Service. This technology makes it possible to transfer data at high-speeds, up to 115kbps.

¹² Universal Mobile Telecommunications System.

¹³ M. Lindgren, J. Jedbratt and E. Svensson, *Beyond Mobile: People, Communications and Marketing in a Mobilized World*, Palgrave, Basingstoke, Hampshire, 2002.

- ¹⁴ See also B. Rao and L. Minakakis, 'Evolution of mobile location-based services', *Communications of the ACM*, Vol. 43, No. 12, 2003, pp. 61-65.
- ¹⁵ For a review see M. Stienstra, M. Baaij, F. Van den Bosch and H. Volberda, 'Strategic renewal of Europe's largest telecom operators (1992-2001): From Herd Behaviour towards strategic choice?' *European Management Journal*, Vol. 22, No. 3, 2004, pp. 273-280; and T.J. Gerpott and N.M. Jakopin, 'The degree of internationalization and the financial performance of European mobile network operators', *Telecommunications Policy*, Vol. 29, 2005, pp. 635-661. See also M.P. Joshi, R.J. Kashlak and H.D. Sherman, 'How alliances are reshaping telecommunications', *Long Range Planning*, Vol. 31, No. 4, 1998, pp. 542-548.
- ¹⁶ M.L. Katz and C. Shapiro, 'Network externalities, competition and compatibility', *American Economic Review*, Vol. 75, No. 3, 1985, pp. 424-441.
- ¹⁷ See 'The battle over mobile television', *Fortune*, May 30, 2005, p. 18.
- ¹⁸ N. Negroponte, *Being Digital*, Knopf, New York, 1995.
- ¹⁹ See M. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, Free Press, New York, 1980; and *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, New York, 1985.
- ²⁰ R. Normann and R. Ramirez, *Designing Interactive Strategy: From the Value Chain to the Value Constellation*, John Wiley & Sons, Chichester, 1994; C. Stabell and Ø. Fjeldstad, 'Configuring value for competitive advantage: on chains, shops, and networks', *Strategic Management Journal*, Vol. 19, pp. 413-437; C. Parolini, *The Value Net: A Tool for Competitive Strategy*, John Wiley & Sons, Chichester, 1999; D. Tapscott, D. Ticoll and A. Lowy, *Digital Capital: Harnessing the Power of Business Webs*, Harvard Business School Press, Boston, 2000; H. Hakansson and I. Snehota, 'No business is an island: the network concept of business strategy', *Scandinavian Journal of Management*, Vol. 5, No. 3, 1989, pp. 187-200; A.J. Campbell and D.T. Wilson, 'Managed networks: creating strategic advantage', in D. Iacobucci, ed., *Networks in Marketing*, Sage Publishing, London, 1996, pp. 125-143.
- ²¹ See F. Li and J. Whalley, 'Deconstruction of the telecommunications industry: from value chain to value networks', *Telecommunications Policy*, 26, 2002, pp. 451-472; P. Evans and T.S. Wurster, *Blown to Bits: How the New Economics of Information Transforms Strategy*, Harvard Business School Press, Boston, 2000; J.E. Ricart-Costa, B. Subirana and J. Valor-Sabatier, *Sources of Information Value: Strategic Framing and the Transformation of Information Industries*, Palgrave Macmillan, Basingstoke, Hampshire, 2004; F. Li, 'The Internet and the deconstruction of the integrated banking model', *British Journal of Management*, Vol. 12, 2001, pp. 307-322; M. Weiner, N. Nohria, A. Hickman and H. Smith, 'Value networks – the future of the US electric utility industry', *Sloan Management Review*, Vol. 38, 1997, pp. 21-40; H.R. Varian, *Effect of the Internet on Financial Markets*, Working Paper, School of Information Management and Systems, University of California, Berkeley, September, 1998; Ø.D. Fjeldstad, M. Becerra and S. Narayanan, 'Strategic action in network industries: an empirical analysis of the European mobile phone industry', *Scandinavian Journal of Management*, Vol. 20, 2004, pp. 173-196.
- ²² R. P. Nielsen 'Cooperative strategy', *Strategic Management Journal*, Vol. 9, 1988, pp. 475-492; and J. Bleek and D. Ernst, *Collaborating to Compete: Using Strategic Alliances and Acquisitions in the Global Marketplace*, Wiley, New York, 1993.
- ²³ R. Madhavan, B. Koka and J. Prescott, 'Networks in transition: how industry events (re)shape interfirm relationships', *Strategic Management Journal*, Vol. 19, 1998, pp. 439-459.
- ²⁴ R. Normann and R. Ramirez, *Designing Interactive Strategy: From the Value Chain to the Value Constellation*, John Wiley & Sons, Chichester, 1994
- ²⁵ M. Iansiti and R. Levien, *The Keystone Advantage: What the New Dynamics of Business Ecosystems Means for Strategy, Innovation and Sustainability*, Harvard Business School Press, 2004.
- ²⁶ Of course, in the mobile services ecosystem, the concept of 'the network' has particular meaning as the data transmission infrastructure: this is not the meaning here.
- ²⁷ J.C. Jarillo, 'On strategic networks', *Strategic Management Journal*, Vol. 9, No. 1, 1988, pp. 31-44.
- ²⁸ R. Madhavan, B. Koka and J. Prescott, 'Networks in transition: how industry events (re)shape interfirm relationships', *Strategic Management Journal*, Vol. 19, 1998, pp. 439-459.
- ²⁹ O.E. Williamson, *The Economic Institution of Capitalism: Firms, Markets, and Relational Contracting*, Free Press, New York, 1985. See also O.E. Williamson, 'Markets and Hierarchies: Some elementary considerations', *American Economic Review*, Vol. 62, No. 2, 1973, pp. 316-325.
- ³⁰ Ouchi has suggested a third option, that of clans. See W.G. Ouchi, 'Markets, bureaucracies, and clans', *Administrative Science Quarterly*, Vol. 25, No. 2, 1980, pp. 129-141.

- ³¹ T.W. Malone, J. Yates and R.I Benjamin, 'Electronic markets and electronic hierarchies', *Communications of the ACM*, Vol. 30, No. 6, 1988, pp. 484-497; J.D. Day and J.C. Wendler, 'The new economics of organization', *The McKinsey Quarterly*, No. 1, 1998, pp. 4-18.
- ³² P. Butler, T.W. Hall, A.M. Hanna, L. Mendonca, B. Auguste, J. Manyika, and A. Sahay, 'A revolution in interaction', *The McKinsey Quarterly*, No. 1, 1997, pp. 5-23.
- ³³ M. Iansiti and R. Levien, *The Keystone Advantage: What the New Dynamics of Business Ecosystems Means for Strategy, Innovation and Sustainability*, Harvard Business School Press, 2004.
- ³⁴ See W.H. Davidow and M.S. Malone, *The Virtual Corporation: Structuring and Revitalizing the Corporation of the 21st Century*, Harper Collins, New York, 1992; N. Venkatraman and J.C. Henderson, 'Real strategies for virtual organizing', *Sloan Management Review*, Fall, 1998, pp. 33-48.
- ³⁵ J. Hagel and M. Singer, *Net Worth: Shaping Markets when Customers Make The Rules*, Harvard Business School Press, Boston, 1999. These functions are analogous to Treacy and Wiersema's value dimensions of "customer intimacy", "product/service innovation", and "operational excellence". See M. Treacy and F. Wiersema, 'Customer intimacy and other value disciplines', *Harvard Business Review*, January-February, 1993, pp. 84-93; *The Discipline of Market Leaders: Choose Your Customers, Narrow your Focus, Dominate your Market*, Harper Collins Publishing, London, 1995. Sabat has suggested a split between upstream customer facing ("retailing") and downstream support services ("network operation"). See H.K. Sabat, 'The evolving mobile wireless value chain and market structure', *Telecommunications Policy*, Vol. 26, 2002, pp. 505-535.
- ³⁶ C. Stabell and Ø. Fjeldstad, 'Configuring value for competitive advantage: on chains, shops, and networks', *Strategic Management Journal*, Vol. 19, pp. 413-437.
- ³⁷ For a discussion as to how fragmentation can improve coordination in international telecommunications, see P. Genschel, 'How fragmentation can improve co-ordination: setting standards in international telecommunications', *Organization Studies*, Vol. 18, No. 4, 1997, pp. 603-622.
- ³⁸ H. Sekino, A. Tripathy and M. DiCapua, *Your Brand, Unplugged: A Strategic and Structured Approach to Launching an MVNO*, DiamondCluster International Inc., Chicago, Ill., 2005.
- ³⁹ R. Schmalensee, 'A note on the theory of vertical integration', *Journal of Political Economy*, Vol. 81, 1973, pp. 442-449; H.W. Chesbrough and D.J. Teece, 'When virtual is virtuous? Organizing for innovation', *Harvard Business Review*, January-February, 1996, pp. 65-73.
- ⁴⁰ J.F. Rayport, and J.J. Sviokla, 'Exploiting the virtual value chain', *Harvard Business Review*, November-December, 1995, pp. 75-85; J.F. Rayport and J.J. Sviokla, 'Managing in the marketplace', *Harvard Business Review*, November-December, 1994, pp. 141-150.
- ⁴¹ See D. Blankenburg Holm, K. Eriksson and J. Johanson 'Creating value through mutual business network relationships', *Strategic Management Journal*, Vol. 20, 1999, pp. 467-486; J.C. Anderson, 'Relationships in business markets: exchange episodes, value creation, and their empirical assessment', *Journal of the Academy of Marketing Science*, Vol. 23, No. 4, 1995, pp. 346-350.
- ⁴² J.C. Andersson, H. Hakansson and J. Johanson, 'Dyadic business relationships with a business network context', *Journal of Marketing*, Vol. 58, No. 4, 1994, pp. 1-15.
- ⁴³ M.V. Alstyne, 'The state of network organization: A survey in three frameworks', *Journal of Organizational Computing*, Vol. 7, No. 3, 1997; S. Klein, *Interorganisationsystem and Unternehmensnetzwerke*, Duetscher Universitaets-Verlag, Wiesbaden, 1996; J. Sydow, *Strategische Netzwerke*, Gabler, Wiesbaden, 1992; C.J. Fombrun, 'Strategies for network research in organizations', *Academy of Management Review*, Vol. 7, No. 2, 1982.
- ⁴⁴ O.E. Williamson, 'Comparative economic organization: the analysis of discrete structural alternatives', *Administrative Science Quarterly*, Vol. 36, 1991, pp. 269-296; C. Snow, R. Miles, H. Coleman, 'Managing 21st century network organization', *Organization Dynamics*, Vol. 20, No. 3, 1992, pp. 5-20.
- ⁴⁵ O.E. Williamson, *The Economic Institution of Capitalism: Firms, Markets, and Relational Contracting*, Free Press, New York, 1985.
- ⁴⁶ N. Tichy, and A. Fombrun, 'Network analysis in organisational settings', *Human Relations*, Vol. 32, 1979, pp. 923-965.
- ⁴⁷ B. Arthur, 'Increasing returns and the two worlds of business', *Harvard Business Review*, July-August, 1996; B. Arthur, 'Positive feedbacks in the economy', *Scientific American*, February 1990, pp. 92-99; N. Economides, 'The economics of networks', *International Journal of Industrial Organization*, Vol. 14, 1996, pp. 673-699.
- ⁴⁸ R.B. Woodruff, 'Customer value: the next source of competitive advantage', *Journal of the Academy of Marketing Science*, Vol. 25, No. 2, 1997, pp. 139-153.

⁴⁹ D. Flint, R.B. Woodruff and S.F. Gardial, 'Customer value change in industrial marketing relationships: a call for new strategies and research', *Industrial Marketing Management*, Vol. 26, No. 2, 1997, pp. 163-175.

⁵⁰ N. Tichy, and A. Fombrun, 'Network analysis in organisational settings', *Human Relations*, Vol. 32, 1979, pp. 923-965.

⁵¹ 'Profiting from obscurity', *The Economist*, May 5, 2005.

⁵² Examples taken from C. Anderson, 'The Long Tail', *Wired*, October, 2004.

⁵³ M. De Lussanet, *Mobilizing Content for 3G Delivery*, Forrester, London, 2004.

⁵⁴ M. De Lussanet, *Mobilizing Content for 3G Delivery*, Forrester, London, 2004.

⁵⁵ See *Web Services Interfaces – An Engine of Innovation*, Nokia White Paper, Helsinki, Finland, 2002. See also J. Hagel III and J.S. Brown, 'Your next IT strategy', *Harvard Business Review*, October, 2001.

From value chain to value network: Insights for mobile operators

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