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STRATEGIC RESOURCES: TRAITS, CONFIGURATIONS AND PATHS TO SUSTAINABLE COMPETITIVE ADVANTAGE

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The resource-based view (RBV) of the firm holds that certain assets with certain characteristics will lead to sustainable competitive advantage. All the traits are required to be present to result in sustainable competitive advantage. Such a trait approach overlooks the dynamics of the creation of firm resources especially the strategically important factors as identified by the resource based view theory. We propose that the resources are made up of factor networks which have specific interfactor and inter-resource relationships that result in the characteristic traits being evidenced. These strategic resource factor relationships include network type, available substitutes and cogency relationships (compensatory, enhancing and suppressing.) Specific configurations that lead to high or very high support of sustainable competitive advantage are proposed. Twenty-two specific paths to sustainable competitive advantage for a factor, contingent on resource factor traits and relationship configurations, are proposed. The implications, upon confirmation of these configurations, are discussed.

Positioning the firm for a sustainable competitive advantage by utilizing the firm's strengths to exploit opportunities and neutralize threats while avoiding or fixing weaknesses has long served as the core framework for formulating the firm's strategy (Learned *et al.*, 1965). This 'SWOT' analysis benefited greatly from the insights of industrial organizational economics, especially the work of Porter (1980; 1985). Porter's famous 5 forces model emphasized analyzing industry structure to assess the rent earning potential of the industry based on entry and exit barriers. While Porter's framework has provided many useful insights to both practitioners and researchers by concentrating on the external 'OT' side of the analysis, it nonetheless suffers from several significant problems.

Key words: Resource-based view of the firm, networks, systems, strategic configurations, strategic resources

First, it runs the risk of being tautological, i.e., it posits that firms in attractive industries are successful. They are successful because they are in attractive industries. A second, but more important limitation of this framework is pointed out by Porter (1991) himself. The framework is concerned with the cross-sectional problem and not the longitudinal problem. The cross-sectional problem focuses on what makes some industries, and some positions within them more attractive. It does not address why some firms are able to get into advantageous positions in the first place, and why some firms are able to sustain these positions and others are not. A third limitation stems from the implicit advice it gives to managers for formulating strategy. McWilliams and Smart (1993) point out that it misdirects managers to focus on industry level characteristics, encouraging them to expend resources on influencing the industry's structure even though their firm will not uniquely benefit from the changes, thus allowing competitors to free ride on the firm's

expenditures. One could possibly justify this if it could be shown that industry structure was the dominant determinant of firm performance. Recent evidence however, (Rumelt, 1991; Roquebert, Phillips, and Duran, 1993), suggests that, at best, industry structure accounts for 8–15 percent of variance in firm performance. Furthermore, strategies based on market power can be disastrous to the firm. For example, Carr (1993) in his analysis of the vehicle components industry found that firms utilizing a market power based strategy significantly underperformed, on multiple performance measures, their competitors who followed a resource-based strategy.

These limitations lead many (e.g., Barney, 1986, 1991; Grant, 1991) to argue that strategy formulation starts properly, not with an assessment of the organization's external environment, but with an assessment of the organization's resources, capabilities, and core competencies. This resource based view (RBV) of the firm approach which emphasizes the internal side of 'SWOT' analysis to strategy formulation is gaining in popularity among strategy theorists (Reed and DeFillipi, 1990; Summer *et al.*, 1990; Meyer, 1991; Porter, 1991; Peteraf, 1993; Barney, 1991, 1992). This emerging framework already contributes some promising insight into conditions leading to sustainable competitive advantages (Conner, 1991; Grant, 1991; Peteraf, 1993). RBV theory notes that differences in firm resources will lead to differences in sustainable competitive advantage (SCA).

Porter argues that RBV theory also runs the risk of being tautological, 'Successful firms are successful because they have unique resources. They should nurture these resources to be successful (1991: 108).' Barney (1993) points out that the independent variables of RBV are defined at one level of analysis (the level of resources or bundles of resources) while competitive advantage, not economic rent *per se*, (the dependent variable) is at a different level of analysis (the level of strategies that the firm is pursuing). In essence, the independent variable is at the functional level and the dependent variable is either at the business or corporate level. This eliminates the charge of RBV being tautological.

Bromiley (1993) notes that RBV theory requires some concrete definitions of resources that is less than 'anything that leads to perform-

ance.' There is acknowledged difficulty in determining *a priori* what firm resources might lead to a sustainable competitive advantage given the inherent uncertainty of the external environment (Peteraf, 1993; Fiol, 1991). Nonetheless, Bromiley's (1993) call for the operationalization of RBV theory is well taken.

Jay Barney begins to address this issue by identifying the needed characteristics of firm resources and presents this in the VRIO framework (Barney and Griffin, 1992; Barney, 1992). This framework assesses the economic performance implications of resources by evaluating the resources for the characteristics of value, rareness, inimitability and organizational orientation (VRIO).

The value of a resource will be dependent upon the firm's combination of resources and the path that the firm is following. In other words, value is the fit of the resource or factor to strategy combined with the fit of the strategy to the external environment. The rareness of a specific resource depends upon the combination of physical rareness in the factor market and/or the rareness of the perceived value of the resource due to a firm's particular resource combination. Inimitability is the continuation of imperfect factor markets via restricted information, the cost of recreating the specific combination of resources that give a synergistic result, or a combination of the two. Substitutability rests on the continuation of imperfect factor markets, the costs involved in the recreation of specific combination, or the cost of finding a new combination of resources that will enable the firm to compete for the same product market (i.e., a new path with new requirements). Barney's framework combines inimitability and nonsubstitutability into one category by treating nonsubstitutability as a specialized case of inimitability. Finally, the VRIO framework also explicitly considers if the organization is oriented to utilize its strategic resources.

However, the VRIO framework, while implicitly acknowledging the importance of a dynamic view, treats the evaluation of resources from a stand alone viewpoint ignoring how resources are nested in and configured with one another and the nature of relationships between them. Thus while Barney *talks* about bundles of resources, the VRIO framework treats resources as singular distinct items.

Another internal analysis that also reflects this bundling problem is the Capital Asset Pricing Model (CAPM). When CAPM is used to assess an investment decision, it considers a portfolio of investments as a cross-sectional point-in-time issue similar to RBV theory and its bundle of resources. CAPM assessments ignore whether an investment in one project will affect the profitability of other ongoing or potential projects (Oviatt, 1989). Rather than investigating these internal relationships it assumes away these problematic interactions. Furthermore, as Robins notes in his evaluation of the CAPM model, the existence of firm specific capital raises 'serious problems in the use of the CAPM to estimate the risk associated with a capital project.' (1992: 528) He points out that all firms have collateral assets (X-assets) that are firm specific but do not have defined opportunity cost and do not exist in isolation from other tradeable assets. A firm's ability to generate quasi-rents is a function of the interaction between these X-assets and other marketable assets that the firm possesses. Yet, these X-assets (e.g., organizational routines, company policy, culture, etc.) will result in errors in the assessment of risk because of the unknown nature of that interaction. This example not only highlights the bundling problem but also points out the inadequacies of financial statements to accurately display asset value. This latter point is also supported by Hall as he too questions 'the significance of any quantification of shareholder' funds which does not recognize the value of intangible assets' (1992: 135).

Although the use of teams or bundles of resources have been acknowledged in RBV theory (Grant, 1991; Dierickx and Cool, 1989; Fiol, 1991), most researchers do not address the dynamic aspects of bundling resources and their implications to RBV. Thus, while the RBV theory runs the risk of evaluating and categorizing resources without reference to the system in which those resources are embedded, it has not totally ignored interfactor relationships. For example, two such postulated relationships are Teece's (1986) discussion of cospecialized assets, and Amit and Schoemaker's (1993) notion of complementarity relationships affecting the value of a resource. However, these ideas of how resources within a firm interact with things both inside and/or outside the firm to create sustainable competitive advantage need further development.

In this paper we operationalize RBV theory by developing the network of relationships among resources that is necessary for the creation of the characteristic traits identified by RBV theorists that are needed to attain a sustainable competitive advantage. The paper is organized as follows. The first section gives definitions of key RBV terms used in this paper. The second section looks closer at the contribution network theory makes to our understanding of firm resources. The third section clarifies the identification of RBV strategic system resources. The fourth section discusses the potential strategic relationship configurations in detail. The last section presents implications from this expansion of the RBV theory and our conclusions.

DEFINITIONS OF FIRM RESOURCES AND RELATIONSHIPS

Given the relative youth of RBV theory, we explain our usage of the key terms and concepts. By accepting resources as the basic unit of analysis (Grant, 1991) and constraining the resources of interest to strategic resources which are those that are theoretically characterized as valuable, rare, neither imitable and/or substitutable, and which an organization is oriented towards using (Barney, 1986, 1991; Dierickx and Cool, 1989; Summer, *et al.*, 1990), we bound our area of interest.

RESOURCE FACTORS AND CATEGORIES

Several researchers decompose firm resources into combinations of resource 'factors' or 'assets' (Barney, 1986; Dierickx and Cool, 1989; Porter, 1991; Grant, 1991; Mahoney and Pandian, 1992). Since 'assets' implies something that is owned by a firm and factors include either ownership and/or control, we choose to use factors as the elements making up a resource. While specific relationships between the factors that make up a particular resource have remained unexplored, general characteristics have been addressed. Barney (1986) points out that resource factors differ in their 'tradeability.' A tradeable factor is one that can be specifically identified and its monetary

value determined via a 'strategic factor market.' Tradeable factors' availability and monetary value in the factor markets will reflect the market's awareness of those factors' total rareness (physical and/or particular use). By implication, a nontradeable factor will be firm specific and will not directly have its monetary value determined via that 'strategic factor market.' As an example, Arrow has earlier brought attention to the factor of 'trust' which, if purchased, immediately creates doubts in the mind of the purchaser about what he/she purchased. This is a prime example of something built up over time that is valuable but not tradeable. He emphasizes this point in the following:

Trust and similar value, loyalty, or truth-telling are examples of what an economist would call "externalities." They are goods, they are commodities; they have real practical value; they increase the efficiency of the system, enable you to produce more goods or more of whatever values you hold in high esteem. But they are not commodities, for which trade on the open market is technically possible or even meaningful. (1974: 23).

Dierickx and Cool (1989) suggest that resources should be differentiated as either asset flows or asset stocks. An asset flow is a firm resource that can be obtained or adjusted immediately. An asset stock is a firm resource which cannot be adjusted immediately and which is built up over time from asset flows (Dierickx and Cool, 1989). We name this aspect the Acquisition Process. Again since a company may utilize both something it directly owns and something that it controls, we choose to use 'factor' in referring to the element that helps to create a resource.

The creation of a 2X2 matrix with the two dimensions of 'tradeability aspects' and 'acquisition process aspects' enables us to look at four factor types as described in Table 1. Note that four general factors types are possible: tradeable asset flows, nontradeable asset flows, tradeable asset stocks, and nontradeable asset stocks. It is the bundling of these four types of factors that results in a particular resource. Thus resources can be viewed as a configuration or network of factors. This in turn implies that there will be specific relationships between the factors.

RESOURCE CATEGORIES

Several resource level categorizations recently have been presented in the literature. Barney (1991) groups all firm resources into three categories: physical capital resources (Williamson, 1975), human capital resources (Becker, 1964) and organizational capital resources (Tomer, 1987). Grant (1991) lists six categories of firm resources: financial, physical, human, technological, reputation, and organizational. These categorical schemes appear to miss the key issue in the search for sustainable competitive advantage (SCA). The key issue for firm resources, as regards to the creation and maintenance of SCA, is based on the ability of the resource to generate rent. While rent generation's economic root is based on the differential between the expected rent and the actual rent attained by a resource (Barney, 1993) the bulk of the work rests also on implications of scarcity.

Scarcity is related to the ease of identification of the bundle of factors that creates or is the resource. If the bundle is a relatively simple one which can be identified, then the ability to imitate or find substitutes is increased and the opportunity for rent generation is decreased (Grant, 1991) and vice versa. Thus a more useful categorization would be one that focuses on this scarcity issue. Because of the link between scarcity and identification, we chose to categorize resources on the degree to which the factors that make up the resource bundle can be identified. This categorization divides firm resources into two types: contained resources and system resources.

Contained resources

A contained resource is comprised of an identified *simple network* of resource factors that can be monetarily valued. By network, we mean the configuration of factors, as well as, their relationships with each other that results in a particular firm resource. We think that including both factors and their relationships is an important distinction, for the same reason that a list of ingredients from a recipe is not a cake. A cake requires the ingredients plus their relationships among them for a successful result. A simple network is one with relatively few, mostly direct,

links among a small number of factors. 'Simple,' thus, implies that the network has definite boundaries. It is possible, then, to identify contained resources and, once identified, to monetarily value them (Barney, 1986; 1989). This supports Barney's contention that both asset stocks and asset flows are tradeable either at the resource level or, barring that, at the factor level. This implies that if a factor is nontradeable, then, the nontradeable factor must have a substitute that is tradeable or alternatively be broken into component parts to allow market value to be imputed to the resource. If the nontradeable factor has no tradeable substitute and can not be broken down into tradeable components then, although the network it is embedded in may appear simple, the nested nontradeable factor implies that the network is complex.

When we compare this categorization to Barney's (1991) three categories, it is evident that since physical and some human resources are 'tradeable' (Barney, 1991; Williamson, 1975), contained resources will typically include them. Given the transparency of the simple network, contained resources are unlikely to directly lead to a SCA.

Two conditions may occur where they might support a SCA. First, the contained resource is disguised either by being overlooked by competitors or by being hidden or kept secret by the firm. In either case, since they are either tradeable or have substitutes that are tradeable, they will be subject to quick erosion once discovered. Second, they might be only one factor of a complex network which as a whole creates the competency that supports SCA. Thus only indirect support is possible in the second case.

System resources

A system resource is created by a *complex network* of firm resource factors. A complex network is one with many direct and indirect links between a large number of factors which are made up of nested system resources, contained resources and other resource factors. 'Complex' implies that the network doesn't have definite boundaries which will make monetary valuing implausible. Generally speaking, a system resource is socially created. As a

social creation, it is endowed with the implied creation and recreation of social constructs. By contrast, a contained resource is more similar to a discrete artifact. Indeed, it is the attributes of social creation that make the identification of the complex network of system resources difficult (Barney, 1992; Fiol, 1991). This implies that the complete set or even a significant number of factors will be neither readily nor easily identifiable. This poses problems in monetarily valuing such resources. This also implies that fewer of the factors will be tradeable and that there are fewer substitutes for factors or for the resource as a whole. When Barney's categories of resources (physical resources, human resources and organizational resources) are again evaluated, it becomes evident that all three categories could be involved in the network of a system resource.

In the case of a system resource, organizations are faced with a resource comprised of a complex network that makes an unknown amount of contribution to a capability that may itself be a member of a network of capabilities which lead to a set of competitive advantages. It is clear, that often, while attempting to replicate themselves through autopoietic processes (Morgan, 1983; Smith, 1983), the initial identification of a strategically important system resource happens only when the resource is unintentionally destroyed. For example, consider Xerox's initial decision not to develop further computer hardware and software technologies that later spawned Apple Computers and Microsoft. These firms were participants in the start of major technological changes in which Xerox had given up their ability to create a competitive advantage. Ultimately, it resulted in a loss of competitive advantage in their chosen industry as well. This inadvertent destruction of the support of sustainable competitive advantage can be likened to an internal Schumpeterian shock. In this instance the external environment didn't change but the internal environment evolved and discarded the wrong genetic (resource) endowment. From our example, we can infer that these internal choices may result in a later external Schumpeterian shock. To begin to address the question of identifying the networks of competencies, the general characteristics of networks need to be integrated with RBV theory.

NETWORK THEORY AND THE RESOURCE-BASED VIEW OF THE FIRM

An organization's unique set of assets is the result of the relationships both within and across the levels of factors, resources, and competencies. This results in two types of networks: local networks (McCallister and Fischer, 1983) and structural networks (Berkowitz, 1982). As applied to RBV theory, a local network is the configuration of relationships within a level of analysis as in among the factors, where it is the entire network that results in a resource. The resource is not merely the listing of its factors but is the interaction configuration among the resource factors. Thus if Resource D is composed of factors A, B, and C; its local network consists of all the existing relationships among A, B, and C. For example, one can think simplistically of a unit's performance as a result of the interactions among the capacities of unit members (Factor A), the motivations present (Factor B), and the unit's physical and capital resources (Factor C) (Blumberg and Pringle, 1982).

A structural network is the configuration of relationships between local networks and between a factor of a local network and other networks or factors. Again applying social network theory to RBV theory, this is the configuration of relationships between the focal resource and other resources, as well as, the relationships between other resources and the factors of the focal resource. For example, if one looks at the resource, a unit's performance, as a single entity, it will have links to other resources and yet, individually, its factors (people's skills, attitudes, raw materials, etc.) will simultaneously also have links between resources and/or factors. It is the configuration of both of these sets of links that create the resource's structural network. This structural network will be especially dense for nontradeable factors such as 'trust', given Itami and Roehl's (1987) observation about the simultaneous use of intangible assets.

In summary, a resource's internal factor network is its local network (McCallister and Fischer, 1983), and its relationship outside of its local network is its structural network (Berkowitz, 1982). One might think of the product or resource that is a department's end result as the artifact of the local network and its place in a value

chain will reveal the structural network. Notice that a factor of that product's network, the manager of that department, will also individually have links to other networks (the chain of command relationships). Sayles (1993) notes that the widespread tactic of downsizing and eliminating middle managers may have a serious impact on the firm's ability to retain previous competencies. Given that middle managers play a crucial role in integrating and aligning competencies, the competency is destroyed in the letting go of the managers (Sayles, 1993). This happened due to a lack of understanding of the inter-resource relationships that make up the competency and results in further destruction of other competencies due to the structural relationships that were involved.

Since a competency includes system resources as factors, the competency's local network will include all its component resources' local networks (since a resource is definitionally its local network). However, we do not expect a competency's structural network to be just the sum of its resource's structural networks. Just as the resource as a distinct entity has relationships to other resources, we also expect a competency will have relationships with other competencies. For example, consider the case where G. M., under Roger Smith, spent 50 billion dollars retooling and still wound up being the high cost producer. We argue that this occurred because plant and equipment are only one resource in the competency (lean manufacturing) that they were striving to attain and the weak link was the relationships needed with other resources, such as management, HRM systems, the supply chain, engineering, etc. (Womack, Jones, and Roos, 1990).

A competency's structural network will include all of the factors' structural networks, as well as, the overall competency's external relationships. This hierarchical nesting relationship is believed to exist from the most nested single factor through the overall organization as a unit (Berkowitz, 1982). Figure 1 shows a pictorial representation of the hierarchical nestings of factors, resources, and competencies.

Notice the dotted local network relationship lines in the system resource linking all the factors together. Then, in the bottom network presentation, note that the system resource is imbedded in the competency's local network. As

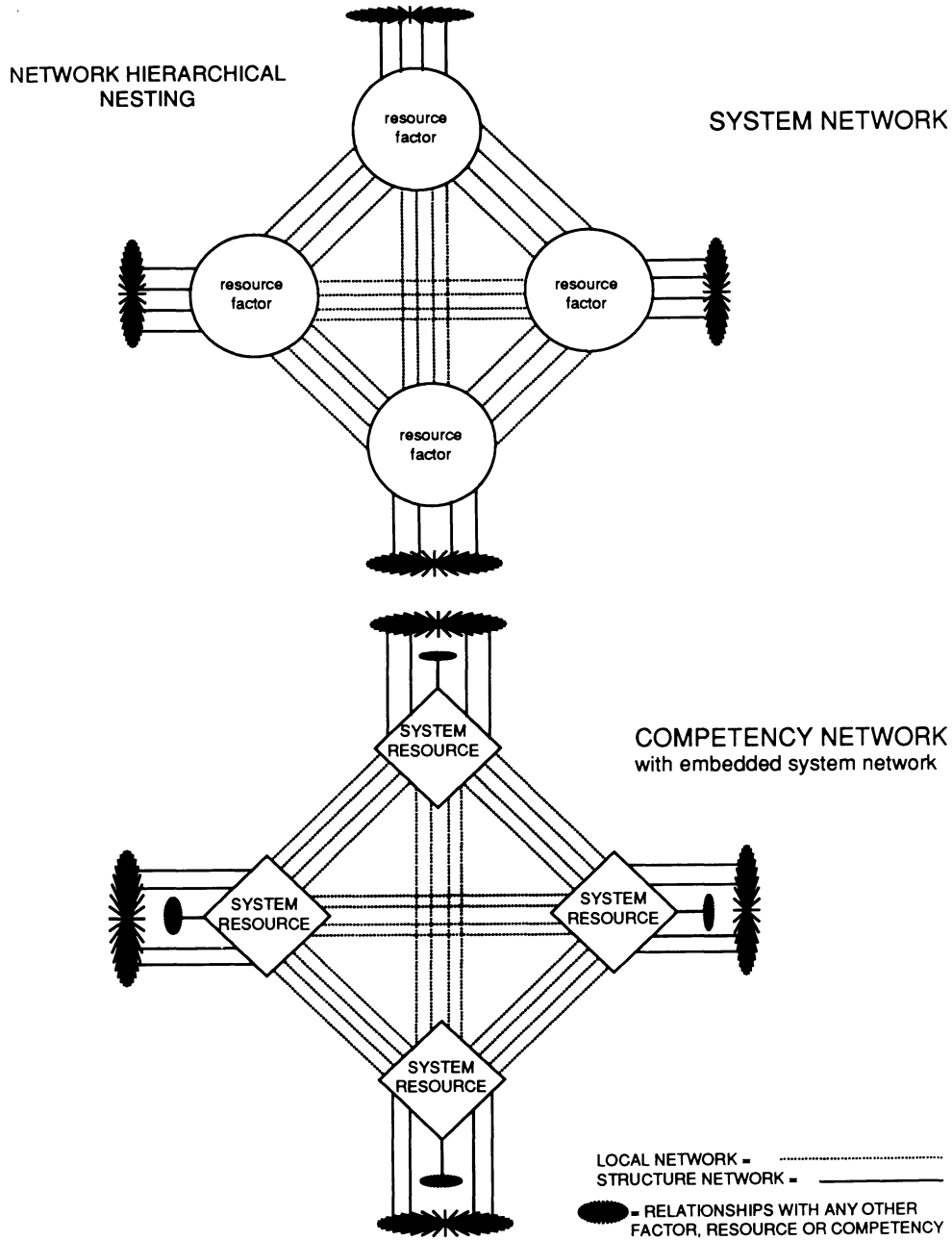


Figure 1. Network hierarchical nesting

implied in Figure 1, the local networks and the structural networks are not independent. While this creates problems in understanding causal relationships, it helps us to understand the creation of organizational synergy. It provides further support of the idea of 'emergent powers

being created when some objects or individuals are internally related to each other to form a structure' (Tsoukas, 1989).

Given the potential complexity of the creation of firm resources, the RBV framework provides a useful heuristic for discriminating between

situations of competitive parity, temporary competitive advantage or sustainable competitive advantage (Barney, 1992). Although RBV literature has evaluated a resource as a discrete unit (Barney, 1992; Amit and Schoemaker, 1993; Grant, 1991), in the following section we show how it also can enable us to look for relationships that are believed to lead to high or very high support of sustainable competitive advantage. In other words, to look for the relationships that are resulting in the desired characteristics.

RBV implied strategic relationships

In looking for strategic relationships, we note from the literature that Schoemaker (1990) suggests that it is necessary to explore how socially complex resource factors and resources magnify or diminish each other, but he doesn't specify what form those relationships may take. In a similar vein, Grant (1991) points out the need for examining intra and intercapability resource relationships. Likewise, Conner (1991) has noted a nested condition in regard to asset stocks and flows. Amit and Schoemaker (1993) suggest that these complexities create nestedness problems across organizational level. Robins (1992) argues that it is these firm specific relationships which generate quasi-rents since the tradeable factors (barring market inefficiencies) would have their value bid away.

It has been argued that the needed characteristics of firm resources to generate rents also make it unlikely if not impossible to be able to determine *a priori* the set of resources needed to gain or sustain a competitive advantage (Barney, 1986, 1991; Peteraf, 1993; Robins, 1992). Certainly, uncertainty in the external environment contributes to this *a priori* determination problem but equally important is the uncertainty in the internal environment due to the relationships between the factors that make up a resource, between resources that make up competencies and between the competencies that are needed to follow a firm's strategy. The nestedness problems may also point to important relationships across the levels, as well as, within them.

We propose that these relationships are implied by the characteristics already identified as needed for SCA. Amit and Schoemaker (1993) expanded upon Barney's VRIO (1992) base characteristics.

Valuable was expanded to include the subdimensions of an external link of 'overlap with strategic industry factors, and implied internal fit issue of 'complementarity'.' Rare was expanded to include scarcity and low tradeability. Inimitable was broken out into inimitability and limited substitutability. Finally Barney's 'O' from 'VRIO', organized to capitalize on the resource, would align with Amit and Schoemaker's appropriability and durability characteristics.

The finer grained characteristics provided by Amit and Schoemaker (1993) do provide a better screening but the dynamic nature involved in the bundling of the factors and resources into competencies remains a mentioned but not integrated feature. Our application of social network theory begins to unravel some of the issues of the dynamics. In our presentation, the choice of a resource to be evaluated is a reflection of the management's belief in the overlap of the resource with the relevant key industry factors (Amit and Schoemaker, 1993). We do not address this external link but turn our attention inwards to the determination of just what it is that causes a resource to exhibit the rest of the needed characteristics. The issues of tradeability, durability and possibly appropriability are reflections of the 2X2 Tradeability and Acquisition Process matrix of factor types. The issues of perceived scarcity and inimitability are reflections of the complexity of the network. While substitutability ramifications may also be a reflection of the complexity of the network, they also may mitigate that complexity and so substitutability stands as a separate relationship. The internal value represented by complementarity, appropriability and possibly durability are the reflections of what we term cogency relationships. These additional dynamic and key relationships are built on Schoemaker (1990), Amit and Schoemaker (1993), and Robins (1992). We suggest that cogency relationships have three forms: compensatory, enhancing, and suppressing/destroying.

A compensatory relationship exists when a change in the level of one resource is offset by a change in the level of another resource. This relationship may be symmetric or asymmetric. Note that here we focus on changes in existing resources and not on replacing the existing resource. Furthermore, compensatory relationships are not equivalent to substitutability

relationships. For example, increased effort can make up for differences in ability but it can't substitute for lack of ability.

An enhancing relationship exists when the presence of one factor magnifies the impact of a different factor. Amit and Schoemaker (1993) refer to this as complementarity. We do not think that enhancing relationships require a bilateral dependence as is implied in Amit and Schoemaker's discussion of complementarity. That is, an enhancing relationship may also be unidirectional or asymmetric. Changes in A magnify changes in B but not vice versa. For example, Magic Johnson, a famous U.S. basketball player, was noted for making other players better; other players didn't make him better (some might suppress his ability but not enhance it). Another example arises from Parthasarthy and Sethi's (1992) analysis of flexible automation use in manufacturing systems. They found that when both scope and speed flexibilities were in place, along with a flexible automation system, then there was a positive significant effect on performance. If there was only the presence of either speed or scope flexibilities with the flexible automation, then there was no significant effect on performance. This illustrates the enhancing relationship between the contained resource (speed and scope flexibilities) and the contained resource (flexible automation system) but not compensatory relationship that result in the positive performance differential.

Likewise, suppressing relationships exist when the presence of one factor diminishes the impact of another. The lack of ability on the part of other players suppressing Magic Johnson's playing was previously acknowledged as a suppressing relationship. Again using Parthasarthy and Sethi (1993), they found that a mechanistic structure had a negative effect on the relationship between flexible automation and performance levels. An extreme case of suppression would be the complete destruction of the resource. An example would be in the clash of cultures in merging companies with the ultimate destruction of the suppressed culture.

The strategic value of cogency relationships is proposed to be dependent upon specific intra and interresource inherited characteristic traits and network and substitutability relationships. This view is consistent with the concept of equifinality in open system theory and supports

the concept of multiple paths leading to SCA for firms with heterogeneous resources. In other words, value is the fit of the factor (and its relationships to other factors in the resource network) to strategy combined with the fit of the strategy to the external environment. Indeed, value may not be determined for each resource factor individually but for an entire bundle. For example, if the ways of equally competing include Resources A, B, C, D, E, F, G, H and I but in certain combinations; then Firm 1 may use A + B + C, while Firm 2 may use A + D + E. At the same time, Firm 3 may use G + H + I and Firm 4 may use B + E + F. Therefore, resource A has value for Firms 1 and 2, but not for Firms 3 and 4. The value depends on what other factors are present or controlled by the specific firm in question. This implies that a resource factor as such may not be a substitute but that the entire bundle or configuration of the resource factors may act as a substitute for another and different bundle of resource factors. It is this aspect of configurational use of resource factors that allows firms to pursue similar competitive strategies with different resources. We believe, this also helps to explain why firms following different generic competitive strategies can be equally successful (Conant, Mokwa and Varadarajan, 1990) and why there are no consistent differences in performances between strategic groups (Cool and Schendel, 1988). We present theoretical combinations of factor characteristics (or attributes) and relationships, as well as, potential benefits of these proposed heuristics. Later in this paper, we develop these relationships more fully (See Figures 3-6). Before further exploring the relationships among resources, we need to identify the strategic system resource.

IDENTIFICATION OF STRATEGIC SYSTEM RESOURCES

To summarize, a strategic system resource is a socially created complex network comprised of tradeable and nontradeable factor stocks and flows and their relationships with each other. While complexity may be desirable to confound competitors, complexity makes it difficult for firms to create, manage, exploit and nurture their resources. Amit and Schoemaker (1993) highlight

the difficulty of making decisions about resource development and deployment in the face of uncertainty and complexity. Although the specifics of a system resource will be dependent upon its context, we develop a conceptual framework to explain the key dimensions and the relationships between them in an effort to enlighten a firm as it copes with this issue and to highlight specifically the implication of a network orientation to the bundling problem noted earlier.

System resource local network dimensions

In considering the composition of the system resource network, we use the five strategic dimensions presented above. The dimensions are related to basic factor characteristics and their interfactor relationships. Recall that the four basic factor types are derived from the four cell matrix utilizing Tradeability aspects (Barney, 1986) and Acquisition Process aspects (Dierickx and Cool, 1989). The applicable time dynamism issues for this factor are included in the Acquisition Process dimension (Dierickx and Cool, 1989; Grant, 1991; Nelson and Winter, 1982; Porter, 1991). Recall also that the relevant relationships derived from the characteristics needed to support SCA include Network Type (Dierickx and Cool, 1989; Grant, 1991), Substitut-

ability (Barney, 1991, 1992; Grant, 1991), and Cogency (Schoemaker, 1990). The Cogency relationship has three subdimensions: Compensatory, Enhancing and Suppressing relationships. We submit that the relevant relationships can only be considered when a proposed factor has been identified. The specification of these characteristics will enable a firm to determine how much and what type of effort it will take to create and maintain that factor and ultimately the resource and from the resource to the competencies that enable it to achieve its SCA.

Based on the preceding, we now present potential configurations of firm resource factors that we propose are necessary to lead a system resource to high or very high support of competitive advantage. We intend for these paths to be useful heuristics enabling both managers and researchers to address the incredible complexity and uncertainty that the socially created resource inherently has.

POTENTIAL CONFIGURATIONS OF SYSTEM RESOURCE LOCAL NETWORKS

The support of a sustained competitive advantage is proposed to be the result of the specific

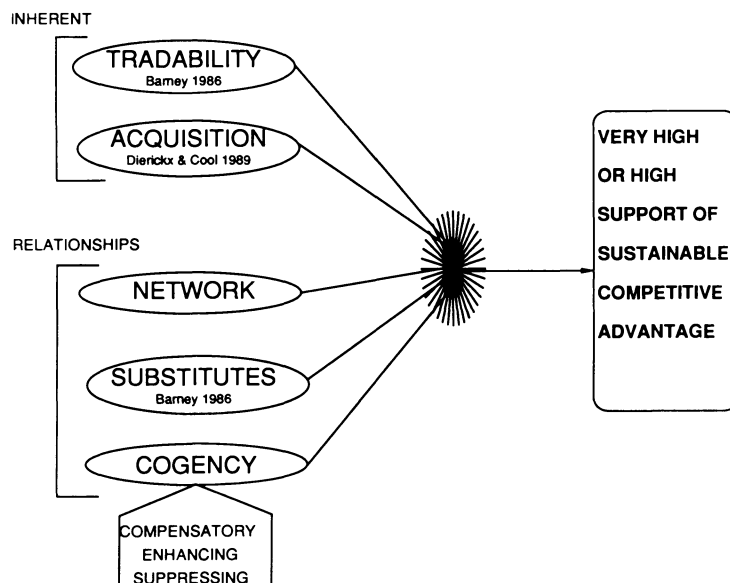


Figure 2. Strategic firm resource factor—inherent traits and relationships

combinations of the listed key dimensions. Thus strategic resources will have networks with the following configuration attributes. By using the RBV theory as previously presented by Barney (1992), the potential 256 combinations of inferred relationships are reduced to only 22 strategic configurations that theoretically support a SCA. The specific configuration for a particular factor can be identified by tracing a decision line through the proposed strategically necessary relationships. While acknowledging that many of these questions have a range of answers, for the sake of parsimony, these combinations are shown in the form of decision trees (See Figures 3–6) and are discussed below. To minimize redundancy, the logic for the path choice is presented with the original path presentation. All subsequent presentations of that decision path are based on the original logic.

Tradeable asset flow

If a resource factor is a tradeable asset flow, it will only provide support for SCA in the presence of X-assets (Robins, 1992) (recall that an X-asset is the firm specific asset that allows the attainment of a quasi-rent). We propose three configurations that can provide high support. They start with the requirements of the tradeable asset flow being a factor of a system resource that is in a complex network (Node 1, YES) where substitutes for the element are not available (Node 2, NO). These decisions address the issues of rareness and time dependency by creating ambiguity in the factor's role in the firm resource and impacting the amount of time it would take a competitor to imitate it. The firm's path to high support of SCA is attained when the factor has a compensatory cogency relationship only with nontradeable factors (Node 3, NO; and Node 4, YES), because decisions 3 and 4 again diminish the tradeability and flow aspects by allowing it to be offset with a firm specific asset only (Path a). The last two paths (b and c) do not have any compensatory relationships (Nodes 3 and 4, NO) but have either an enhancing (Node 5, YES) or neutral cogency relationship (Nodes 5 and 6, NO) with any other system factor. We present the enhancing cogency relationship as a path since this type of a relationship may increase the particular factor's importance since it may be the only possible factor that can provide that particular enhancing capability.

Nontradeable asset flow

A nontradeable asset flow factor can provide high support if it is a member of a system resource with a complex network (Node 1, YES). This context diminishes the problem for SCA from the time dependency aspect of the factor. If it has substitutes (Node 2, YES), but there are no compensatory relationships either with tradeable or nontradeable network factors (Nodes 3 and 4, NO) and there is an enhancing relationship (Node 5, YES; Path d), the factor may still lead to SCA due to the last relationship working to increase its specific importance to the network. Note that this particular configuration may be capable of only temporary high support due to the substitutability relationship, if the substitute also is capable of providing an enhancing relationship.

Additional paths are postulated when this factor has no substitutes (Node 2, NO). Depending upon whether or not this factor has a compensatory relationship with other nontradeable factors, there are three possible paths to SCA. If it does have a compensatory relationship with a nontradeable factor (Node 4, YES), this is sufficient to lead to high support of SCA (Path e). If, however, it does not have any compensatory relationships (Nodes 3 and 4, NO), it can lead to very high support of SCA if it has an enhancing relationship (Node 5, YES; Path f). We believe that if the factor does not have an enhancing relationship it will still support SCA if it also does not have any suppressing relationships (Node 6, NO; Path g). A comparison of Figures 3 and 4 suggests that nontradeable asset flows provide an additional path to SCA and where the paths are similar suggest that in some cases the magnitude of the effects may be greater.

Tradeable asset stock

When the factor under consideration is a tradeable asset stock, it will provide high support when it is a member of a complex network (Node 1, YES). This provides a starting point for assessing the six paths that lead to high support of SCA. We will first discuss the two paths for which substitutes exist (Node 2, YES). If the factor has no compensatory relationships with other tradeable network factors (Node 3, NO) but has a compensatory relationships with other nontradeable factors (Node 4, YES), that is sufficient to provide support

RESOURCE FACTOR --
TRADEABLE ASSET FLOW

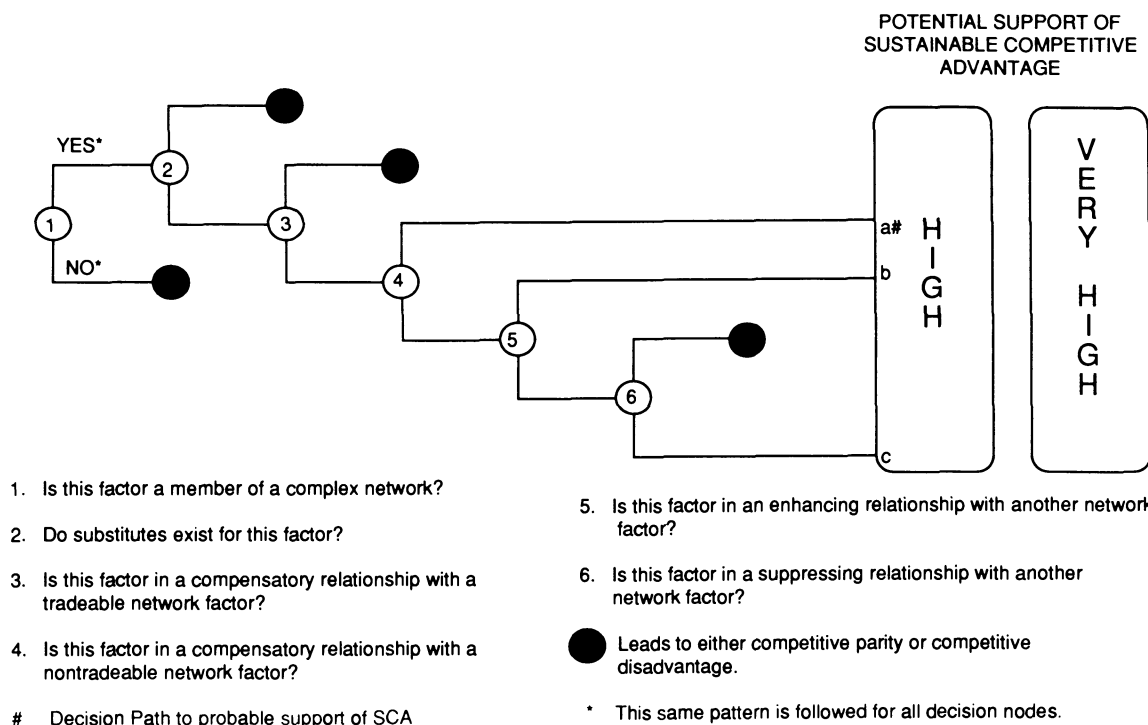


Figure 3. System resource local network configuration decision tree

of SCA (Path h). If, however, the factor has no compensatory relationships with nontradeable network factors (Node 4, NO), it can still lead to SCA if it has an enhancing relationship with other network factors (Node 5, YES; Path i). While it is possible that due to the availability of a substitute for these two configurations to be imitated or entirely substituted for, the overall effect of the enhancing relationship, the time dependency of the stock and the complex network causing ambiguity about the factor's role make it unlikely.

Returning to Node 2, if no substitutes exist (Node 2, NO) and even if this factor has compensatory relationships with other network factors without regard to tradeability (either Nodes 3 or 4, YES), it can still lead to at least high support of SCA (Path j). The compensatory relationship with a nontradeable network factor (Node 4, YES) magnifies the path effects to very high support due to the complex network creating ambiguity about the factor and the offsetting abilities are tied to firm specific, or very rare, factors (Path k).

If no compensatory relationships exist (Node 4, NO), two paths will still lead to SCA. In the first instance, if this factor has an enhancing relationship with another network factor (Node 5, YES), then it will lead to very high support of SCA (Path 1). The more of these enhancing relationships, the stronger the support of SCA. It will still provide support without an enhancing relationship if it does not have a suppressing relationship (Node 6, NO; Path m). This is possible, because given the rest of the factors in that local network, it is not likely that competitors will be able to timely duplicate this resource due to the time constraints in creating this tradeable asset stock and the complex network.

Nontradeable asset stock

The strongest supporter for sustained competitive advantage is the nontradeable asset stock. Compared to tradeable asset stocks, nontradeable asset stocks provide the basis for three new paths and the magnification of some path effects.

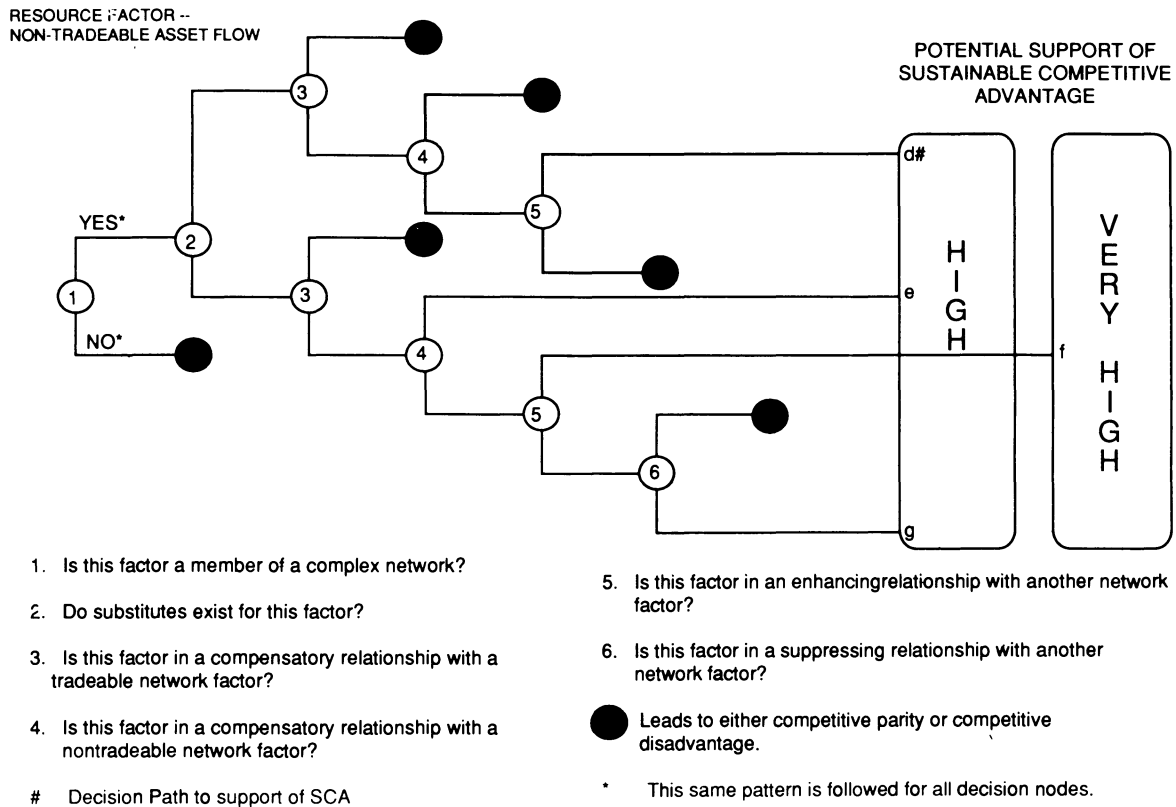


Figure 4. System resource local network configuration decision tree

Paths m, o, p, q and r follow the same logic as Paths h, i, j, k, and l explained above with respect to Figure 5. Path t suggests that the potential for support of SCA is very high when the asset stock is nontradeable compared to when it is tradeable (Path m, Figure 5). This magnifying effect is due to the firm specific nature of nontradeable asset stock. Below we discuss paths s, u, and v.

If a nontradeable asset stock is a complex network member (Node 1, YES) without substitutes (Node 2, NO) despite the fact that there may be no compensatory nor enhancing relationships existing (Nodes 3, 4, and 5, NO), even if there is a suppressing relationship with another network factor (Node 6, YES) providing the suppressing relationship is not resource or competency destroying, high support of SCA (Path s) is still achievable. Note that not all suppressing relationships are harmful to firm resources either because they do not suppress a

core 'incompetency,' i.e., a core competency which hinders the organization's competitiveness. Miller (1990) notes how a firm's focus on its core competencies may ultimately be self-destructive—a process he refers to as the Icarus Paradox.

The last two paths do not require a complex network (Node 1, NO). They do require that no substitutes exist (Node 2, NO) but they do not require compensatory relationships (Nodes 3 and 4, NO). Providing that there is either an enhancing relationship (Node 5, YES) or at least no suppressing relationships (Node 6, NO), they lead to high support of SCA (Paths u and v). Having no substitutes available will increase the importance of the firm specific aspects and time dependency aspects. The lack of compensatory relationships among the factors does not hinder the value and the enhancing relationships increase the firm specific value. The neutral cogency relationship demonstrates that it at least does not detract from value creation.

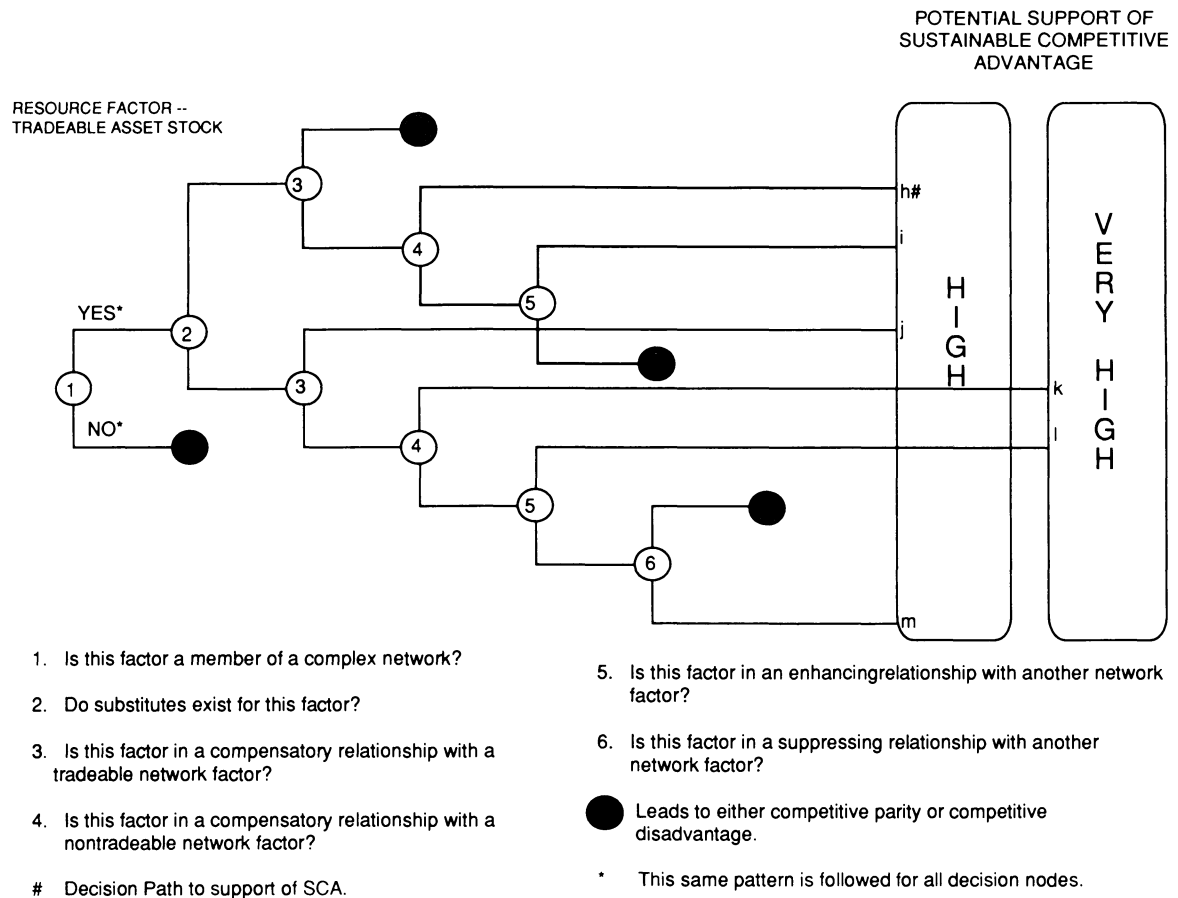


Figure 5. System resource local network configuration decision tree

Configuration implications

The logic articulated above suggests that while the debate between Barney (1986, 1989) and Dierickx and Cool (1989) may be unimportant in the sense that one can achieve SCA no matter what combination one starts from, it is important in the sense that the number of potential paths available increases as one moves from flows to stocks and tradeable to nontradeable. There are nine unique paths that can at least potentially lead to high support of SCA. When these decision paths are constrained by the resource factor types, the 22 paths just presented occur.

CONCLUSIONS AND IMPLICATIONS

Practitioner implications

Recall that numerous practitioner problems were noted earlier in this paper. The problem of inadvertently destroying a strategic resource by divestiture or abandonment (Xerox's example), the problem of choosing incorrectly based on a risk assessment that does not include firm specific resources (Robin's 1992 argument), the problem of not understanding the relationships among bundled things and their importance to the utilization of those bundles are all problems that practitioners address with each strategic decision they make. This configurational network

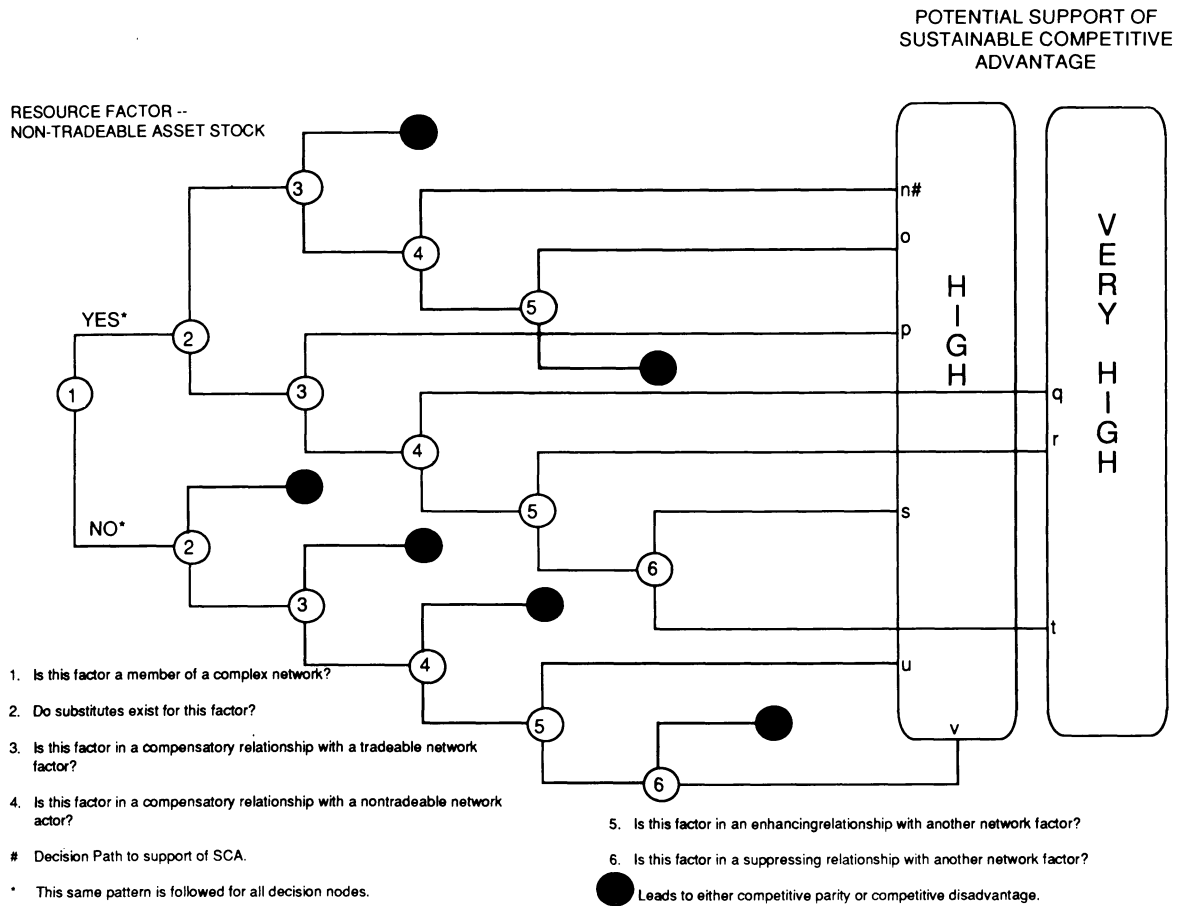


Figure 6. System resource local network configuration decision tree

approach allows practitioners to determine the effort it will take to create and maintain the system asset of interest. By using the six strategic questions, a practitioner should be able, in addition to more fully identifying resources that make up their strategic competencies, to understand the implications of changing one factor of one resource on other apparently unrelated resources.

While the exact set of resource factors, competencies and distinctive competencies will vary from firm to firm and over time, this framework gives practitioners a starting point to more efficiently develop, change and use their resources. It also enables the confirmation of an educated guess about a firm resource and to expand a subset of important factors. As Coff has noted, in many instances a practitioner not only cannot look to a financial statement

or analysis for many of the strategic resources of a firm (since these firms explicitly exclude them) but 'must actually IGNORE information from these sources to be successful in the long run' (emphasis in the original, 1993:1). This analysis will provide them with somewhere to look and depending upon their ability to forecast the future, where to invest in system resources.

Research implications and conclusions

The configurational aspects of a resource bundle suggest that, while the external environment is important in determining and sustaining rent potential, other elements at either the strategic group or firm level are also important (Rumelt, 1991). Some may argue that rents are not sustained but are earned all at once though they

may be extracted over time.¹ We argue that because resources implicitly have different economic life cycles, they are continually bundled, unbundled, and rebundled. This results in rents being sustained rather than earned all at once. This also implies that a firm may be using a portfolio of rents instead of attaining a singular sustainable competitive advantage. The degree to which a firm can keep its currently rent-generating resources from being appropriated by rivals is the degree to which a firm can maintain its competitive position.

By closely examining the resource based view of the firm theoretically implied characteristics, necessary relationships (factor type, network membership, substitutability and cogency relationships) among factors can be identified. Following this identification of relationships, factor network configurations that lead to high or very high support of sustainable competitive advantage are proposed. We present a total of 16 projected configurations that should lead to high support and six that lead to very high support of sustainable competitive advantage. These are the configurations of relationships among the factors needed to create a system resource that can support the attaining of a sustainable competitive advantage. In other words, the configuration of factors and relationships allows the creation of a resource that has the needed strategic characteristics of valuable rare, inimitable and organized to utilize.

The specific combination for any firm will be a result of the firm's history (and thus its existing set of firm resource factors), a firm's strategy, and the degree to which the firm's strategy fits the external environment, especially in regard to its competitors. The nesting relationships of factors, resources, competencies and distinctive competencies calls for firm resources comprised of contained resources and system resources.

We specifically see the use of substitution relationships and cogency relationships as the screening for strategic resources. The appropriate combination of substitution, compensatory, enhancing, neutral and suppressing relationships in a system resource makes it possible for all resource factor types to lead to sustainable

competitive advantage. If the promise of these configurations holds upon confirmation by field research, then these configurations and their base definitions are an operationalization of resource based view of the firm theory. In such a case, then the cross-sectional static view of the firm's ability to have a set of resources to attain a sustainable competitive advantage will be clarified as requested by Porter (1991). This would also be a starting point to address the longitudinal processes by which a firm creates and/or maintains such a competitive advantage. With this operationalization, field work and testing of the firm resource based theory of sustainable competitive advantage on the intrafirm level is attainable.

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¹ Our thanks to Jay Barney for pointing this out.

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