

ABSTRACT

Resource-based view theory focuses on resources within the organisation, under its direct control. Evidence for the existence virtual strategic resources was identified in the automotive, aerospace, banking and software industries. Conditions for an external strategic resource included being non-transferable, existing in a complementary structure, linked to complementary products or processes, knowledge-oriented, facilitated by social and power relationships, and able to be developed under network conditions. Constructs that linked internationalisation theory, actor-network theory and agency theory to the management of virtual resources were identified. Key locations identified for virtual resources were within the organisation's supply chain and within non-associated industries.

KEYWORDS: resource-based view, business performance

INTRODUCTION

Barney's (1991) resource-based view (RBV) of business level performance was developed based on a foundation of corporate planning perspectives. It represented a new way of looking at opportunities for improving business level performance and explaining the performance differences between organisations experiencing the same external environment. It described the characteristics of the organisation and how they function and contains few behavioural assumptions [42]. One of the few exceptions, implicit in the characteristics of strategic resources identified by Barney and others (e.g. [5, 27, 1, 13, 7, 14]) as well as the constructs which have been developed or the RBV (described in detail below), is the assumption that the organisation directly controls its strategic resources [42]. The assumption that a Ricardian rent can only be extracted from resources in the control of the organisation [46, 58] is inconsistent with observable behaviour. Organisations may extract rent from sources that they do not own [56]; one example would be the use of third-party knowledge in product innovation.

Changes to typical industry structures, the increasing role of the Internet and globalisation have led to a change in the location of strategic resources. For example, the automotive industry in almost every country has transferred responsibility for the bulk of their R&D activities to their suppliers. Long considered to be a strategic resource in this industry, R&D which results in

vehicle improvement such as new features and performance, results from the R&D capabilities of the component suppliers of the industry. This industry now concentrates on its ability to manage suppliers to have the best access to the best R&D possible [57]. This paper presents a perspective on the resource-based view which incorporates the dimension that strategic resources may be located outside the direct control of the organisation, yet still contribute significantly to that organisation's performance.

This perspective is particularly consistent with other contemporary strategic management perspectives including network and agency theory. Agency theory takes an economic view of business control and suggests that the choices managers make can be influenced by punishment and rewards, to ensure that manager's goals are congruent with the owner's goals [18]. The RBV can be coupled with agency theory to provide better explanations of strategic behaviours where virtual resources exist. For example, a study of 439 franchisors determined that franchisors decreased the proportion of franchisees as they grew, due to the increasing scarcity of resources to sufficiently support the business within the organisation, but increased the proportion of franchisees over time as they became more confident of the agency relationship with their franchisees [10] and, so, were able to access resources outside the organisation (amongst the franchisees). In a similar manner, the RBV can be combined with institutional theory to explain strategic behaviours. Institutional theory correctly predicts that an institution can develop trust to create a useful endogenous resource among staff for the development of desirable resources. For example, resources developed in this manner have been found to lead to quality-based competitive advantage [35].

From the resource-based perspective, this enables the development of strategic resources to be encouraged through the use of appropriate control mechanisms. Where the resources are virtual, however, it may not be possible for owners to apply control mechanisms with the same degree of effectiveness. Also, the more separate the ownership of the organisation, the greater the agency costs associated with aligning manager's goals with the owner's goals [18]. The existence of virtual resources means that the effectiveness of these controls for an organisation's resource development would be lower and so the agency costs would rise more quickly with increasing owner separation. This construct is not

incorporated in the resource-based view at present. If organisational performance is substantially a reflection of the utilisation of strategic resources, agency theory may not be valid under situations where significant proportions of virtual resources are utilised.

Actor-network theory suggests that knowledge is constructed by a heterogeneous network of people and mechanisms [68]. It adds a decision-making dimension to the role of resources in the organisation and a dynamic characteristic [42]. Actors in networks as creators of specialised knowledge are, therefore, important drivers of the development of strategic resources [8], confirming the likely existence of valuable virtual resources where those actors are external to the organisation. Actor network theory also suggests that resources are not necessarily fixed to some part of the organisation [68] and so clearly possess some mobility.

The paper will provide a review of the theory that led to the resource-based view, including the definitions of a strategic resource and the constructs that have been developed around that view. It will then consider evidence from a number of industries that supports the existence of strategic resources that contribute significantly to business level performance that lie outside the control of the organisation. It will then propose a new set of definitions for the strategic resources outside the direct control of the organisation (virtual resources) and some of the constructs that are likely to apply, and address their external validity through support from network and agency theory.

LITERATURE REVIEW

The contribution of the RBV to explaining variations in organisational performance is considerable compared to the explanatory value of other models, such as Porter's 1980s perspective on the role of industry determining profitability for the organisation. In the mid-1990s, a four-year longitudinal study of 2800 US businesses determined that, whilst industry conditions explained 4% of profitability variation, individual company resources could explain 44% of profitability variation across companies [65]. A more recent study in Spain involving 1642 organisations, found that industry conditions explained 3% and company resources explained 36% of performance variation [44].

Despite its obvious contributions, the RBV literature has provided very limited empirical testing of its ability to predict Competitive Advantage (CA) and the literature calls for the

development of constructs through which it can be applied; as will be demonstrated.

The RBV contains elements of the structure and cost (economics) theories of the determinants of performance in an industry [7]. It also contains components of Industrial Organisation (IO) theories, such as the economic models of perfect competition and transaction cost theory, but rejects other elements making it independent of existing IO theories [15]. Its development was also strongly influenced by the work of Penrose, representing a further departure from mainstream IO theory [40].

The RBV theory development commenced with the work of economists such as Chamberlain, as early as the 1930s, evolved through the contributions of strategy researchers, such as Ansoff, in the 1960s and 70s, and was formalised through a prodigious volume of conceptual development of the topic in the late 1980s [23]. Barney's 1991 explanation of the RBV postulates that a CA can be derived from resources and capabilities that are valuable, rare, difficult to imitate and not substitutable [6]. The RBV has provided a very useful taxonomy for the analysis of the contribution of specific business disciplines to organisational value creation, such as human resource management [76], entrepreneurship and international business literature, and some contributions to the economic literature in the areas of causality [6].

At the time of Barney's work, resources were identified as physical, human or organisational. Since then RBV theory has been extended by the addition of the dynamic capabilities perspective (the development of the ability to apply resources to create a CA), and the knowledge perspective (which integrates organisational learning) [44, 53]. Many subgroups of resources have also been identified [23]. More recent research has focused on the impact of the management skills available in the organisation to control the conversion of resources into CA [23]. Research in this area has identified skills, processes and assets as possible leverages (capabilities) for converting resources into a CA [53]. Recent research involving 164 organisations determined that CA for manufacturing can result from proprietary processes and specialised equipment which can only be acquired using knowledge gained from internal and external sources [66]. This suggests that knowledge may actually form part of a barrier to substitution through imitation, and supports the rarity criteria proposed by Barney.

Table 1 below shows the various criteria recommended by Barney and other selected researchers. The difference between these sets of criteria is quite small. Barney's four criteria set is

the more suitable for the empirical research discussed in this paper because of the simplicity, clarity of definition and scope of coverage of the criteria. Grant's criteria focus more on the internal management perspectives and do not include the value that the resources create. Internal management perspectives will be considered in this research as research variable focus criteria. Collis and Montgomery's [14] criteria are essentially the same as Barney's [7], except for the addition of durability. Durability is a second order criterion which, whilst clearly contributing to the long-term viability of the organisation, is less important from the research perspective than the creation of value. It can also be argued that the durability criterion is represented by the criteria value. Amit and Schoemaker's [1] criteria overlap with Barney's [7] criteria, with the exception of durability and complementarity. Durability has been identified as a second order criterion, and complementarity is considered to be more appropriately measured as a research variable focus criterion, rather than as a resource criterion. For this reason, Barney's criteria were adopted as the independent variables for this research. Complementarity is considered as one of the research variable focus criteria, and durability is considered in the discussion for the time dimension it contributes as it is clearly identified in Barney's criteria.

Barney's criteria were adopted as the independent variables for this research, although the term durability is also considered later in this paper, as it introduces a time dimension less emphasised by Barney's criteria.

Table 1. Resources Criteria Necessary for CA Creation by Researcher

Resource Criteria	Researcher
Value, rareness, inimitability and non-substitutability	Barney [5, 7]
Durability, transparency, transferability and applicability	Grant [27]
Inimitability, durability, appropriability, substitutability and competitive superiority	Collis and Montgomery [13, 14]
Complementarity, scarcity, low tradeability, inimitability, limited substitutability, appropriability, durability and overlap with strategic industry factors	Amit and Schoemaker [1]

Although there has been some good conceptual RBV development, researchers agree that empirical examination of the RBV has been inadequate to identify the relationship between the characteristics of resources and capabilities when CA is created

(constructs), or the ability to use it to predict or control the creation of CA [23, 44, 2, 41, 46, 68]. Most of the RBV empirical research to date has been focused on isolated areas of business operations and has led to few generalisable and unifying conclusions regarding the application of RBV theory. Unquestionably, further empirical research in this area is required to fully explore the unifying capability of RBV theory [15, 42, 46, 56, 68]. Such research should consider the organisation in its entirety and investigate one (or more) single bounded industries so that the impact of variations between local environments and across industries (even if this factor is small), is eliminated. In this way, the empirical research findings are more likely to be generalisable (so as to identify support for the RBV) [25] and create the necessary constructs for different contexts and industries [74, 39].

The empirical RBV research to date has determined that the capability to utilise resources for CA is affected by the efficiency of the business unit operations and corporate decision-making processes [54, 63, 46]. This finding supports the importance of investigating the impact of management skills noted earlier. The impacts of capabilities are difficult to separate when considering outputs as the dependent variable, so it is better to view the capability process from the management and the operations perspectives individually [63, 3].

A study of a cluster of Brazilian wine producers determined that clusters could also share the resources and the capabilities necessary to gain a CA [74]. Not unexpectedly, the research also identified that cognitive mapping of the resources and capabilities of the cluster provided an improved management understanding of how to increase the efficiency of the cluster's capability to transform resources to a CA. Particular resource categories identified were knowledge, technology and production control, and contractual skills. The capabilities identified as necessary to sustain CA included organisational learning and non-codified expertise, long-term investment in technology and staff, long-term investment in cluster resources (such as research institutes and training colleges), complexity, information asymmetries and specialisation [74].

Research into the US retail food industry determined that a general dynamic capability could affect the application of some resources (such as supply chain management skills), but did not affect other resources (such as environmental management skills). In this instance, external factors were found to affect the application of the environmental management skill resource, although

the participants did not view environmental management as a resource that could create a CA [47]. Another US food retailer study found that ignoring the interdependencies between up and down stream competencies and the environment affected the overall level of CA achieved [69].

Problems with RBV theory

Selection of the correct empirical research methodology to enable the identification of specific resources meeting Barney's criteria and separation of the contributions of these resources to CA, has proven to be one of the difficulties associated with empirical research into the RBV [42]. Industries need to be very homogenous to enable fair comparisons to be made across organisations, and resources can be difficult to identify as many are intangible [23, 44, 63, 2]. Given the definition of valuable resources shown in Table 1, the logical conclusion is that the very best resources will be the hardest to identify [23]. Furthermore, such resources must also be very difficult to attain in the first place [53]. The literature suggests that such resources need to be identified using qualitative methods [64].

Barney's (1991) VRIN framework (value, rarity, irritability and non-substitutable), and Barney's (1996) subsequent VRIO framework (value, rarity, inimitability and organizational appropriability), do not provide a strong measure of the potential for performance, as even resources which are relatively weak according to this metric still correlate with the significant sustained superior performance [3]. This may be partially due to limited attention being given to date to the selection of the correct output variables. Further development of the constructs representing the impact of CA is required for investigation of the RBV. For example, a RBV study of US organisations found that measuring the net value achieved by the resources was a better approach than many of the previous studies which had only considered accounting profit [63].

In addition, the theory does not adequately consider how organisations establish the resources to create CA [49]. Such resources must also be very difficult to attain in the first place [53] and may be explained by linkage, resource leverage and learning [49]. With these characteristics, the resources that are most likely to be targeted for development would most likely be those that are also the least rare, most imitable and most easily transferred [50], as less effort would be required to develop and acquire them. Organisations need to mix internal resource development and external resource acquisition to maximise their dynamic control and minimise the costs associated with causal ambiguity and time compression

diseconomies [50]. This would create a complex resource management and development process which may be integrated with other activity development processes.

Criteria for empirical testing of the application of RBV

The following criteria for empirical testing of the application of RBV were extracted from the literature review above and have been classified under the following three headings:

Theory Evaluation Criteria:

1. Measurement of the benefit predicted by the RBV theory [2].
2. Generalisation of empirical findings to support RBV [25].
3. Production of contextual constructs from findings [39].

Research Variable Focus Criteria:

4. Treatment of resources as an input to advantage (to avoid the circular definition of advantage in identifying the resources that created it as valuable) [23].
5. Consideration of the process of the development of the resources (time compression diseconomies, interconnectedness, scales of mass efficiency, causal ambiguity and the resource development trajectory relative to industry conditions can affect the contribution that these resources actually make) [23, 49].
6. Identification of the use of management control to convert the resource to customer-perceived value [23].
7. Consideration of multiple resources when complementary resources need to be integrated with core resources [69].
8. Measurement of impact of management, process, regional and scale effects on the capability to utilise resources to create a CA [63].
9. Differentiation of use of internal development versus external acquisition as a measure of maturity of resource development for CA (considering the time compression diseconomies and causal ambiguity effects associated) [50].
10. Identification of individual resource criteria evaluation techniques [50].

Specific Findings Criteria:

11. Explanation of performance differences between organisations on the basis of asset differences [15].
12. Identification of the causal structure of resources (capability is difficult to copy because it takes time, even if the resource is acquired) [23, 53].

13. Explanation of how resources can be used to create competitive heterogeneity [53].

The literature review above shows that (a) the definition of strategic resources identified in the literature focuses on features that only internal business characteristics would possess, and (b) the constructs that have been developed around the theory predominantly deal with approaches to management of the application and development of strategic resources that are internal to the organisation. The contemporary literature suggests that organisations utilise resources outside the organisation, over which they have limited control, both by design and by accident [75, 62].

It is interesting to consider the fact that the difficulties in developing constructs for the application of the resource-based view, despite its demonstrated ability to explain differences in performance between organisations operating in the same external environment, have long been identified [42, 3, 46]). This may reflect the fact that investigations into the explanatory power of the RBV for organisational performance were most extensive in the late 1990s when the impact of changes to industry structure, globalisation and the Internet were already in play. A few empirical studies [20] that identified the importance of external resources were already being published by the mid-1990s. It may be that the emerging presence of virtual resources caused the focus of developing constructs, using only an internal focus, to be invalid as an adequate explanation of how organisations perform in the external environment (industry). Had a broader perspective on the location of strategic resources been incorporated in the earlier research, a range of more valuable constructs may have been identified.

With these observations in mind, the research question identified is "should the definition of resources for the RBV be extended to include virtual resources". This research question meets four of the research criteria identified above, namely:

2. Generalisation of empirical findings to support RBV [25]
5. Process of the development of the resources
8. Measurement of impact of management, process, regional and scale effects on the capability to utilise resources to create a CA
9. Differentiation of use of internal development versus external acquisition as a measure of maturity of resource development for CA (considering the time compression diseconomies and causal ambiguity effects associated)

METHODOLOGY

A meta-analysis of the literature was conducted to identify data regarding the impact on business performance of strategic resources located outside the organisation in four industries; automotive, software, aerospace and banking. These industries were selected on the basis of their global scale and the existence of evidence regarding virtual resources. A review of industry reports for each of the selected industries was conducted to identify the terminology associated with virtual resources in the literature related to these industries. These terms were then utilised in a meta-analysis of all scholarly journals regularly publishing articles on the selected industry, utilising three abstracts in databases. An analysis of all journals containing the identified search terms and data on the selected industries resulted in response rates below 0.1% across the databases. Therefore, only journals regularly publishing research on the identified industries were considered to be useful data sources.

FINDINGS

The following findings present empirical evidence from the literature which describes some constructs and the impact of business performance on the use of strategic resources located outside the organisation [75, 9, 62, 59]:

Automotive industry

The response rate for this meta-analysis was:

Database Title	Number of Articles
EBSCO Academic and Business Source Complete	5
Science Direct	0
ABI/Inform Complete	8

Three articles overlapped in two database sources.

A strong demand chain relationship exists within the automotive industry which limits this industry's access to virtual resources located within its suppliers. Where suppliers are able to achieve balanced power relationships due to arrangements such as co-development agreements, greater access to virtual resources prevails [17]. As with the aerospace industry considered below, the automotive industry appears to be better able to access knowledge-type virtual resources, but only amongst suppliers [52]. Companies in the industry with a more formalised demand chain approach to managing suppliers were also able to gain less competitive advantage from virtual knowledge-based resources [24, 21]. This approach may apply predominantly to companies operating in the developed economy sector of the industry.

Companies in segments of the industry in emerging economies, by comparison, have been found to use social capital among networks to access virtual resources and manage the relationships that affect those resources [38]. In emergent economies, the ability to integrate virtual (and internal) resources is more strongly associated with organisational performance than the overall level of resources the company possesses [71]. In the Indian automotive industry, a joint-venture between a local producer and Peugeot was well-supplied with strategic resources, but still proved to be unsuccessful. At the same time, a local company which was able to access and utilise a more limited range of local virtual resources was successful [72]. In the Chinese automotive industry, companies are gaining a competitive advantage through higher levels of innovation than are normally found in the industry as they make greater use of the virtual resources available to them in China [73].

The more dynamic the external environment, the greater the competitive advantage that organisations in this industry can gain from virtual resources [48]. One of the advantages of using virtual resources for companies operating in more dynamic segments of this industry is that capital becomes available for other activities [59]. It also facilitates a greater rate of internationalisation in dynamic environments [61].

Software industry

The response rate for this meta-analysis was:

Database Title	Number of Articles
EBSCO Academic and Business Source Complete	1
Science Direct	0
ABI/Inform Complete	7

No articles overlapped any sources.

Knowledge is a resource that is frequently transferred amongst industry clusters and is an important contributor to innovation as a competitive advantage [16]. A related virtual resource is external R&D skills integrated into external arrangements [51]. The strategic resource of knowledge is shared by cluster members in the software industry so that it provides a competitive advantage to the cluster, relative to other software industry clusters. The importance of sharing this virtual resource amongst the cluster members is sufficient to be a defining factor in the membership of clusters [16]. Lavie [36] identified the importance of resources existing within networks for the performance of companies in the US software industry. The ability to make use of the resources is affected by the bargaining power of the organisation relative to the more powerful partners

in the network, and the level of industry competition amongst the network members [36].

Virtual resources have also been found to increase industry competition by increasing the resource availability for complementary products produced by other organisations, increasing the competitiveness of the original product and stimulating rivalry amongst competitors [37]. The proportion of virtual resources organisations utilised in this industry is strongly affected by the structure of the organisation and its business level strategy [62]. In terms of geographical coverage, virtual resources in the software industry tend to be located at the regional level to commence with, and are more likely to be found in the international market as the organisation develops [43].

Banking industry

The response rate for this meta-analysis was:

Database Title	Number of Articles
EBSCO Academic and Business Source Complete	5
Science Direct	2
ABI/Inform Complete	5

No articles overlapped any sources.

The banking industry has long relied on virtual resources to reduce operating costs [4, 12] and free-up capital for other activities [11]. The effective use of virtual resources is particularly significant for the achievement of competitive advantage amongst small banks where technical resources and capital are particularly limited [32, 55, 70]. Innovation in emergent segments of the industry, such as Internet banking, is frequently the result of accessing virtual strategic resources [9]. In the Japanese banking industry, the use of virtual strategic resources has resulted in higher levels of technology-based innovations that are applicable across the industry in general [29]. Companies in this industry have also taken advantage of virtual resources specific to locations in which they do not operate to gain competitive advantage [33], and to gain a competitive advantage from access to superior market information [34].

Aerospace industry

The response rate for this meta-analysis was:

Database Title	Number of Articles
EBSCO Academic and Business Source Complete	1
Science Direct	0
ABI/Inform Complete	6

No articles overlapped any sources.

The structure of relationships with other organisations determines the proportion of resources and organisation this industry is able to access [20]. Knowledge is an important strategic resource for this industry and, whilst the capability to maintain and gain a competitive advantage from this resource was found to be strongly linked to organisational performance in this industry, the location of the resource (internal virtual) was not [22]. This suggests that organisations in this industry are equally able to gain a competitive advantage from a virtual resource as they are from an internal resource. On the other hand, it was also found that companies in this industry were less able to gain a competitive advantage from virtual resources where they had to modify their relationship with key external organisations, such as suppliers, in order to access those resources [26]. This industry uses demand to drive its supply chains and so suppliers operate under highly-prescribed relationships [75]. The industry does not make extensive use of networks of cooperating industry members or producers of complementary products where resources are located in the network by mutual agreement.

This limited approach to accessing virtual resources was present in the 1980s and earlier [28]. It does not appear to have been intentional, but rather reflected the demand perspective identified by Williams, resulting from a strong focus on customer and internal resources, rather than the broader environment. Major customers, such as the US Department of Defence, were strong drivers of resource allocation in response to customer demand in some segments of this industry, driving companies away from considering resource location optimisation [45]. In addition to taking advantage of knowledge as a virtual resource, companies in this industry are better able to access virtual resources that lead to innovation as a competitive advantage. Companies in the jet engine manufacturing segment of the industry are more able to access virtual design and materials utilisation knowledge to introduce innovations into existing products and other segments of the industry [67].

FINDINGS

Virtual resources were primarily accessed from suppliers in both the automotive and aerospace industries. An internal and customer focus in the aerospace industry, and a reluctance to develop new network relationships, were the reasons for focusing primarily on suppliers for access to virtual resources. On the other hand, the banking and software industries freely accessed resources from non-connected industries.

Economic conditions influenced the nature and benefit of accessing virtual resources. Other external environmental conditions, such as industry dynamics, also influenced the amount of competitive advantage gained from virtual resources. The utilisation of virtual resources can increase availability of complementary products and so increase industry competition. Access to virtual resources influences the rate of internationalisation.

Table 2. Constructs connecting virtual resources and actor-network theory

Construct	Industry			
	Automotive	Software	Banking	Aerospace
1. Power relationships influence access to virtual resources	X	X		X
2. Social capital influences access to virtual resources	X			
3. Knowledge is a frequently-accessed virtual resource		X	X	X
4. Organisations with fewer internal resources make more use of virtual resources			X	

Managers tended to rely on existing relationships with external organisations, such as suppliers, rather than searching for other types of organisations offering virtual resources. The structure of the organisation also influences the proportion of virtual resources that can be accessed. Smaller organisations possessed fewer internal resources and made more effective use of virtual resources. External R&D was incorporated into network arrangements, and knowledge sharing was used to create clusters around shared virtual

resources, providing a competitive advantage to the cluster.

These findings led to seven constructs which were found to connect with either actor-network or agency theory. These constructs are shown in Tables 2 and 3.

Table 3. Connections between virtual resources and agency theory

Construct	Industry			
	Automotive	Software	Banking	Aerospace
5. Virtual resources access reflects manager rather than owner goals	X			X
6. The integration of virtual resources provides a greater impact on organisational performance in emerging economies	X			
7. The structure of the organisation influences its ability to access virtual resources		X		

Connections with other theories:

The rate of internationalisation is influenced by access to virtual resources in the software and banking industry.

DISCUSSION

The findings suggest a number of conditions for a virtual resource, which are neither exclusive nor compulsory:

1. Non-transferable
2. Existing in a complementary structure
3. Linked to complementary products/processes
4. Knowledge-oriented
5. Facilitated by social and power relationships
6. Able to be further developed under network conditions

The description of a virtual resource is also conditional on its qualifying as a resource, namely, meeting the characteristics of a resource as defined by Barney [7].

The identification of constructs for the utilisation of virtual resources that are consistent with actor-network and agency theory in Tables 2 and 3 indicates that both of these formative theories provide appropriate frameworks through which to view virtual resources. This is an important finding as it eliminates the criticism of the resource-based view (without virtual resources) of being tautological. The criticism of the standard resource-based view being tautological results from an economic perspective that resources which lead to improved organisational performance are defined by the fact that they create greater organisational performance [41]. In defining virtual resources as sources of advantage which are accessed from the external environment through network arrangements and which are affected by agency behaviours, a linear contribution of these resources to business performance is created.

The connection with internationalisation theory was unexpected, but logical, given the global scope and scale of the industries selected as data sources. The finding that the rate of internationalisation increases with access to virtual resources supports internationalisation theory [30] as one of the principal identified forms of external resources is knowledge, and understanding industries in other countries is one of the criteria for movement through the stages of internationalisation. This finding was predicted by the literature, with [31] noting that internationalisation networks were now an important part of internationalisation (although not identifying the mechanisms through which this occurs). This finding also supports OLI theory [19] in that accessing virtual resources means the organisation is able to access sources of competitiveness it can use in other industries.

The findings also indicate that many virtual resources are present in the organisation's supply chain. This is both an appropriate and intuitively attractive conclusion, as the external organisations which are most heavily relied upon are usually suppliers. In addition (and as a result), an organisation or business will invest the most effort in establishing partnerships that transfer advantage with key suppliers.

A further finding is that key resources can come from non-connected industries as well. From the management perspective, this suggests two very different locations for virtual resources: the business's supply chain and non-connected industries. The different approaches taken by organisations in accessing resources identified within the data, for supply-chain-located virtual resources and other virtual resources, support this observation. The constructs in the findings above

have been expressed as the following set of virtual resource management practices for these two locations:

Supply-chain-located virtual resources

Management techniques for resources located in the supply chain would include:

1. Use of supply chain theory practices, such as technology park approaches, trust and communication
2. Use of supply chain development practices, such as lean operations and quality assurance to develop virtual resources present in the supply chain

Non-typically associated industry-located virtual resources

Management techniques for resources located in industries not normally associated with the business would include:

Identification of potential locations for virtual resources

1. Technology forecasting to identify where potential future strategic resources may be aggregating.
2. Industry analysis to identify global industries which are developing quickly and are performing well financially (for example, the resources industry) to identify industries capable of developing virtual resources of interest to the business.
3. Application of Porter's [60] Theory of National Competitive Advantage to identify other national industries which are sufficiently attractive to be potential locations of future virtual resources.

Management of virtual resources in unconnected industries

1. Use of OLI theory to identify attractive industries where company investment in modes, such as joint partnerships, could be utilised to stimulate continuing development and provide some degree of control over virtual resources.
2. Use of agency theory to identify the likely compliance of organisations and industries possessing virtual resources with the needs of the business.
3. Use of actor-network theory to strengthen cooperative relationships with 'owners' of virtual resources through third parties present in the network.

CONCLUSION

This research has identified the existence of strategic resources existing outside the organisation's direct control. Thus, the research question, "Should the definition of resources for the RBV be extended to include virtual resources?" has been answered in the affirmative.

The data suggested six characteristics for a virtual resource, which would add to the characteristics of an internal resource and which primarily reflect the location of the resource, and the organisational relationships affecting access to that resource. The research findings have also indicated that actor-network and agency theory are relevant to the management of virtual resources. Seven virtual resource constructs aligning with these two theories were identified from the data. In addition, one construct relating to internationalisation and OLI theory was identified.

The findings suggested two important locations for virtual resources when considering virtual resource management practices – virtual resources located within the organisation's supply chain, and virtual resources located within industries not directly connected to the organisation. The findings indicated that managing resources in these two different locations will require quite different management practices. Two management techniques for dealing with supply-chain-located virtual resources were developed from the identified constructs. Six management techniques were identified for virtual resources in industries not directly connected to the organisation (three for identifying location, and three for managing the resources).

There is enormous scope for further validation and development of VRT constructs, both within the supply chain and within non-associated industries. Empirical studies examining the contribution of virtual resources to the performance of organisations in specific industries would identify whether their contribution was the same as internally located resources. Empirical research around the eight virtual resource management techniques above would identify more constructs that could be used to identify and predict the development of virtual resources. Additional investigation of the role of virtual resources in internationalisation would identify further constructs around their role in this activity.

REFERENCES

- [1] Amit, R., & Schoemaker, P. J., (1993) 'Strategic assets and organizational rent', *Strategic Management Journal*, Vol. 14, No., pp. 33-46.
- [2] Arend, R. J. (2006). Tests of the resource-based view: do the empirics have any clothes? *Strategic Organization*. 2006/11, 409-422.
- [3] Arend, R. J., & Lavesque, M., (2010) 'Is the Resource-Based View a Practical Organizational Theory?', *Organization Science*, Vol. 21, No. 4, pp. 913-930.
- [4] Barefoot, J. A. S., (1995) 'It's time to trade in your compliance program', *American Bankers Association. ABA Banking Journal*, Vol. 87, No. 10, pp. 36.
- [5] Barney, J., (1991) 'Firm Resources and Sustained Competitive Advantage', *Journal of Management*, Vol. 17, No. 1, pp. 99.
- [6] Barney, J., Wright, M., & Ketchen Jr, D. J., (2001) 'The resource-based view of the firm: Ten years after 1991', *Journal of Management*, Vol. 27, No. 6, pp. 625.
- [7] Barney, J. J., (2001) 'Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view', *Journal of Management*, Vol. 27, No. 6, pp. 643-650.
- [8] Bryson, J. M., Crosby, B. C., & Bryson, J. K., (2009) 'Understanding Strategic Planning and the Formulation and Implementation of Strategic Plans as a Way of Knowing: The Contributions of Actor-Network Theory', *International Public Management Journal*, Vol. 12, No. 2, pp. 172-207.
- [9] Callaway, S. K., (2006) 'Strategic context for bank units: Comparing resource flows for Internet ventures and traditional branches', *The Journal of High Technology Management Research*, Vol. 17, No. 1, pp. 1-15.
- [10] Castrogiovanni, G. J., Combs, J. G., & Justis, R. T., (2006) 'Resource Scarcity and Agency Theory Predictions Concerning the Continued Use of Franchising in Multi-outlet Networks', *Journal of Small Business Management*, Vol. 44, No. 1, pp. 27-44.
- [11] Clark, J. A., (1996) 'Economic Cost, Scale Efficiency, and Competitive Viability in Banking', *Journal of Money, Credit & Banking (Ohio State University Press)*, Vol. 28, No. 3, pp. 342-364.
- [12] Cocheo, S., (2008) '10 outside-the-box strategies for when capital needs a boost', *ABA Banking Journal*, Vol. 100, No. 9, pp. 26-60.
- [13] Collis, D. J., & Montgomery, C. A., (1995) 'Competing on Resources: Strategy in the 1990s', *Harvard Business Review*, Vol. 73, No. 4, pp. 118-128.
- [14] Collis, D. J., & Montgomery, C. A., (2008) 'Competing on Resources', *Harvard Business Review*, Vol. 86, No. 7/8, pp. 140-150.
- [15] Conner, K. K., (1991) 'A Historical Comparison of Resource-Based Theory and Five Schools of Thought Within Industrial Organization Economics: Do We Have a New Theory of the Firm?', *Journal of Management*, Vol. 17, No. 1, pp. 121-154.
- [16] Dayasindhu, N., (2002) 'Embeddedness, knowledge transfer, industry clusters and global competitiveness: A case study of the Indian software industry', *Technovation*, Vol. 22, No. 9, pp. 551.
- [17] Donada, C., (2001) 'Co-development partnerships: Consequences for car suppliers', *International Journal of Automotive Technology and Management*, Vol. 1, No. 2,3, pp. 183.
- [18] Duh, M., (2010) 'Applying Agency Theory and the Resource-Based View in Explaining Performance Differences between Family and Nonfamily Businesses', *Uporaba agencijske teorije in teorije proizvodnih virov pri razlagi razlik v uspešnosti med družinskimi in nedružinskimi podjetji.*, Vol. 56, No. 1/2, pp. 45-52.
- [19] Dunning, J. H., (2003) 'The role of foreign direct investment in upgrading China's competitiveness', *Journal of International Business and Economy* Vol. 4, No. 1, pp. 1-13.
- [20] Dussauge, P., & Garrette, B., (1995) 'Determinants of success in international strategic alliances: Evidence from the global aerospace industry', *Journal of International Business Studies*, Vol. 26, No. 3, pp. 505.
- [21] Dyer, J. H., & Hatch, N. W., (2006) 'Relation-Specific Capabilities and Barriers to Knowledge Transfers: Creating Advantage through Network Relationships', *Strategic Management Journal*, Vol. 27, No. 8, pp. 701-719.
- [22] Erickson, G. S., Bramhandkar, A., & Applebee, I., (2007) 'Intellectual Capital and Financial Performance in Aerospace/Defense', *Competition Forum*, Vol. 5, No. 1, pp. 126.

- [23] Fahy, J., (2000) 'The resource-based view of the firm: some stumbling-blocks on the road to understanding sustainable competitive advantage', *Journal of European Industrial Training*, Vol. 24, No. 2-4, pp. 94-104.
- [24] Fourcade, F., & Midler, C., (2004) 'Modularisation in the auto industry: can manufacturer's architectural strategies meet supplier's sustainable profit trajectories?', *International Journal of Automotive Technology and Management*, Vol. 4, No. 2,3, pp. 240.
- [25] Gibbert, M., (2006) 'Generalizing About Uniqueness: An Essay on an Apparent Paradox in the Resource-Based View', *Journal of Management Inquiry*, Vol. 15, No. 2, pp. 124-134.
- [26] Graham, G., & Ahmed, P., (2000) 'Buyer-supplier management in the aerospace value chain: IMS', *Journal of Manufacturing Technology Management*, Vol. 11, No. 7, pp. 462.
- [27] Grant, R. M., (1991) 'The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation', *California Management Review*, Vol. 33, No. 3, pp. 114-135.
- [28] Greer, W. R., & Liao, S. S., (1986) 'Forecasting Capacity and Capacity Utilization in the U.S. Aerospace Industry: ABSTRACT', *Journal of Forecasting (1986-1998)*, Vol. 5, No. 1, pp. 57.
- [29] Holroyd, C., & Coates, K., (2007) 'Japan Tech: The Foundations of the Innovation Revolution', *Journal of Internet Banking & Commerce*, Vol. 12, No. 1, pp. 1-6.
- [30] Johanson, J., & Vahlne, J. E., (1977) 'The internationalization process of the organisations - Four Swedish case studies', *Journal of Management Studies*, Vol. 123, No., pp. 305-322.
- [31] Johanson, J., & Vahlne, J. E., (2009) 'The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership', *Journal of International Business Studies* Vol. 409, No., pp. 1411-1431.
- [32] Kargar, J., & Blumenthal, R. A., (1994) 'Successful implementation of strategic decisions in small community banks', *Journal of Small Business Management*, Vol. 32, No. 2, pp. 10.
- [33] Kedia, B. L., & Mukherjee, D., (2009) 'Understanding offshoring: A research framework based on disintegration, location and externalization advantages', *Journal of World Business*, Vol. 44, No. 3, pp. 250-261.
- [34] Kubiak, B. F., & Kowalik, M. F., (2010) 'Marketing Information Systems As A Driver Of An Organization's Competitive Advantage', *Journal of Internet Banking and Commerce*, Vol. 15, No. 3, pp. 1.
- [35] Kuei-Kuei, L., Tzu-Hsin, L., & Fang-Chen, K., (2009) 'Why is quality improving continuously? An integrated perspective of institution theory and the resource-based view of the firm', *Total Quality Management & Business Excellence*, Vol. 20, No. 10, pp. 1111-1122.
- [36] Lavie, D., (2007) 'Alliance portfolios and firm performance: A study of value creation and appropriation in the U.S. software industry', *Strategic Management Journal*, Vol. 28, No. 12, pp. 1187.
- [37] Lee, C. H., Venkatraman, N., Tanriverdi, H. s., & Iyer, B., (2010) 'Complementarity-based hypercompetition in the software industry: Theory and empirical test, 1990-2002', *Strategic Management Journal*, Vol. 31, No. 13, pp. 1431.
- [38] Lei, L., Zhiang, L., & Arya, B., (2008) 'The Turtle & Hare Race Story Revisited: Social Capital and Resource Accumulation for Firms from Emerging Economies', *Asia Pacific Journal of Management*, Vol. 25, No. 2, pp. 251-275.
- [39] Levitas, E., (2006) 'What to Do With the Resource-Based View: A Few Suggestions for What Ails the RBV That Supporters and Opponents Might Accept', *Journal of Management Inquiry*, Vol. 15, No. 2, pp. 135-144.
- [40] Lockett, A., & Thompson, S., (2004) 'Edith Penrose's Contributions to the Resource-based View: An Alternative Perspective', *Journal of Management Studies*, Vol. 41, No. 1, pp. 193-203.
- [41] Lockett, A., & Thompson, S. (2010). Through the Looking Glass: Contestability Theory and the Resource-Based View. *Journal of Management Inquiry*, 98-108.
- [42] Lockett, A., Thompson, S., & Morgenstern, U., (2009) 'The development of the resource-based view of the firm: A critical appraisal', *International Journal of Management Reviews*, Vol. 11, No. 1, pp. 9-28.
- [43] Lopez, L. E., Kundu, S. K., & Ciravegna, L., (2009) 'Born global or born regional? Evidence from an exploratory study in the Costa Rican

software industry', *Journal of International Business Studies*, Vol. 40, No. 7, pp. 1228.

[44] Lopez, V. A., (2001) 'An overview review of the resource-based view of the firm, drawing on recent spanish management research.', *Irish Journal of Management*, Vol. 22, No. 2, pp. 105.

[45] Lorenz, S. R., Hubert, J. A., & Maxwell, K. H., (2001) 'Linking Resource Allocation to Performance Management and Strategic Planning', *Aerospace Power Journal*, Vol. 15, No. 4, pp. 34.

[46] Madhok, A., Li, S., & Priem, R. L., (2010) 'The resource-based view revisited: Comparative firm advantage, willingness-based isolating mechanisms and competitive heterogeneity', *European Management Review*, Vol. 7, No. 2, pp. 91-100.

[47] Marcus, A. A., & Anderson, M. H., (2006) 'A General Dynamic Capability: Does it Propagate Business and Social Competencies in the Retail Food Industry?', *Journal of Management Studies*, Vol. 43, No. 1, pp. 19-46.

[48] Martanez-Sajncnez, A., Vela-Jimanez, M. J., Parez-Parez, M., & de-Luis-Carnicer, P., (2009) 'Human Resource Flexibility and Innovation: Competitiveness in the Automotive Industry. ', *Universia Business Review*, Vol., No. 24, pp. 30-43.

[49] Mathews, J. A., (2002) 'Competitive Advantages of the Latecomer Firm: A Resource-Based Account of Industrial Catch-Up Strategies', *Asia Pacific Journal of Management*, Vol. 19, No. 4, pp. 467-488.

[50] Mathews, J. A., (2003) 'Strategizing by firms in the presence of markets for resources', *Industrial and Corporate Change*, Vol. 12, No. 6, pp. 1157-1193.

[51] McNaughton, R. B., (2001) 'Strategic alliances in the software industry', *International Journal of Entrepreneurship and Innovation Management*, Vol. 1, No. 3,4, pp. 444.

[52] Mertins, K., (2003) 'Establishing the synchronous enterprise', *International Journal of Automotive Technology and Management*, Vol. 3, No. 3,4, pp. 164.

[53] Miller, D., (2003) 'An asymmetry-based view of advantage: towards an attainable sustainability', *Strategic Management Journal*, Vol. 24, No. 10, pp. 961-976.

[54] Miller, S. R., Ross, A.D., (2003) 'An exploratory analysis of resource utilization across

organizational units: Understanding the resource-based view', *International Journal of Operations & Production Management*, Vol. 23, No. 9, pp. 1062-1083.

[55] Mohamad, R., & Ismail, N. A., (2009) 'Electronic Commerce Adoption in SME: The Trend of Prior Studies', *Journal of Internet Banking & Commerce*, Vol. 14, No. 2, pp. 1-16.

[56] Nemati, A. R., Bhatti, A. M., Maqsal, M., Mansoor, I., & Naveed, F., (2010) 'Impact of Resource Based View and Resource Dependence Theory on Strategic Decision Making', *International Journal of Business & Management*, Vol. 5, No. 12, pp. 110-115.

[57] Orr, S. C. (2005), Supply Chain Management in the European Automotive Industry. *12th International EurOMA Conference on Operational and Global Competitiveness*, Demeter, K. OOK-Press Ltd, Budapest: Hungary.

[58] Parayitam, S., (2010) 'Economics of Resource Based and Dynamic Capabilities View: A Contemporary Framework', *Academy of Strategic Management Journal*, Vol. 9, No. 1, pp. 83-93.

[59] Parry, G., & Roehrich, J. K., (2009) 'Towards the strategic outsourcing of core competencies in the automotive industry: threat or opportunity?', *International Journal of Automotive Technology and Management*, Vol. 9, No. 1, pp. 40.

[60] Porter, M. E. (Ed.) (1990). *Competitive Advantage of Nations*. New York New York Free Press

[61] Pries, L., & Schweer, O., (2004) 'The product development process as a measuring tool for company internationalisation? The case studies of DaimlerChrysler and Volkswagen', *International Journal of Automotive Technology and Management*, Vol. 4, No. 1, pp. 1.

[62] Rajala, R., & Westerlund, M., (2007) 'Business models - a new perspective on firms' assets and capabilities: observations from the Finnish software industry', *International Journal of Entrepreneurship and Innovation*, Vol. 8, No. 2, pp. 115.

[63] Riahi-Belkaoui, A., (2003) 'Intellectual capital and firm performance of US multinational firms: A study of the resource-based and stakeholder views', *Journal of Intellectual Capital*, Vol. 4, No. 2, pp. 215-226.

[64] Rouse, M. J., Daellenbach, U.S., (1999) 'Rethinking Research Methods for the Resource

Based Perspective: Isolating the Sources of Sustainable Competitive Advantage', *Strategic Management Journal*, Vol. 20, No., pp. 487-494.

[65] Rumelt, M., (1991) 'How much does industry matter', *Strategic management Journal*, Vol. 12, No., pp. 167-185.

[66] Schroeder, R. G., Bates, K. A., & Junttila, M. A., (2002) 'A resource-based view of manufacturing strategy and the relationship to manufacturing performance', *Strategic Management Journal*, Vol. 23, No. 2, pp. 105-117.

[67] Smith, D. J., & Rogers, M. F., (2004) 'Technology Strategy and Innovation: The Use of Derivative Strategies in the Aerospace Industry', *Technology Analysis & Strategic Management*, Vol. 16, No. 4, pp. 509.

[68] Steen, J., (2010) 'Actor-network theory and the dilemma of the resource concept in strategic management', *Scandinavian Journal of Management*, Vol. 26, No. 3, pp. 324-331.

[69] Teng, B.-S., & Cummings, J. L., (2002) 'Trade-offs in managing resources and capabilities.', *Academy of Management Executive*, Vol. 16, No. 2, pp. 81-91.

[70] Tercha, S., (2009) 'Mining for dollars', *ABA Banking Journal*, Vol. 101, No. 6, pp. 36-39.

[71] Venugopal, R., (2005) 'New product performance in emerging markets: two cases from the Indian passenger car industry', *International Journal of Automotive Technology and Management*, Vol. 5, No. 3, pp. 336.

[72] Venugopal, R., (2005) 'Resource-based new product development: insights from the small car project of the Indian company TELCO', *International Journal of Automotive Technology & Management*, Vol. 5, No. 1, pp. 1-1.

[73] Wang, H., & Kimble, C., (2010) 'Betting on Chinese electric cars? - analysing BYD's capacity for innovation', *International Journal of Automotive Technology and Management*, Vol. 10, No. 1, pp. 77.

[74] Wilk, E., Fensterseifer, J.E., (2003) 'Use of resource-based view in industrial cluster strategic analysis', *International Journal of Operations & Production Management*, Vol. 23, No. 9, pp. 995-1009.

[75] Williams, T., Maull, R., & Ellis, B., (2002) 'Demand chain management theory: Constraints and development from global aerospace supply

webs', *Journal of Operations Management*, Vol. 20, No. 6, pp. 691.

[76] Wright, P. M., McMahan, G. C., & McWilliams, A., (1994) 'Human resources and sustained competitive advantage: a resource-based perspective.', *International Journal of Human Resource Management*, Vol. 5, No. 2, pp. 301-326.