

Sustained competitive advantage in small firm virtual organisations

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Summary

This paper examines the factors that affect the sustained competitive advantage of small firm virtual organisations. Virtual organisations are separate firms that for certain activities (transactions) behave as if they were a single firm. A sustained competitive advantage occurs when a strategy is implemented that increases firm value but is not capable of duplication by other firms. The extent of the sustained competitive advantage is illustrated by the longevity of the virtual organisation and benefits derived from the virtual organisation by its members.

The virtual organisation is formed to provide the firms within the virtual organisation access to additional resources. The extent of the sustained competitive advantage is related to the characteristics of the resources controlled by the virtual organisation. These characteristics, based on transaction cost economics and the resource-based view of the firm, are value, specificity, rareness, inimitability and non-substitutability. These attributes form the basis for the model of virtual organisation sustained competitive advantage developed in this paper.

Because virtual organisations consist of a number of individual firms, electronic commerce technologies are necessary to enable inter-organisational co-ordination and to efficiently conduct transactions between firms within the virtual organisation. Electronic commerce technology diffusion and infusion are hypothesised to also affect the sustained competitive advantage of virtual organisations.

The hypotheses will be tested using a case-study approach with firms from south-east Queensland providing the sample.

1. Introduction

Firms are constantly striving to achieve a sustained competitive advantage. Electronic commerce is widely perceived to offer firms this sustained competitive advantage [1]. While the current media focus centres on business-to-consumer electronic commerce [2, 3], electronic commerce also holds substantial promise in the conduct and transformation of business-to-business transactions. One possibility enabled by electronic commerce is the creation and operation of small firm virtual organisations. Virtual organisations are groups of firms that for certain transactions act as a single firm, but they are not separate legal entities [4].

In this paper, I develop a model of virtual-organisation sustained competitive advantage (see Figure 1). The model identifies factors that affect virtual-organisation sustained competitive advantage based on the theories of transaction cost economics, the resource-based view of the firm, and information system diffusion and infusion. A sustained competitive advantage creates value for the firm in a way not replicable by other firms. While a sustained competitive advantage is difficult to quantify, virtual organisations that enjoy long-run stability or produce other benefits are likely to have a sustained competitive advantage.

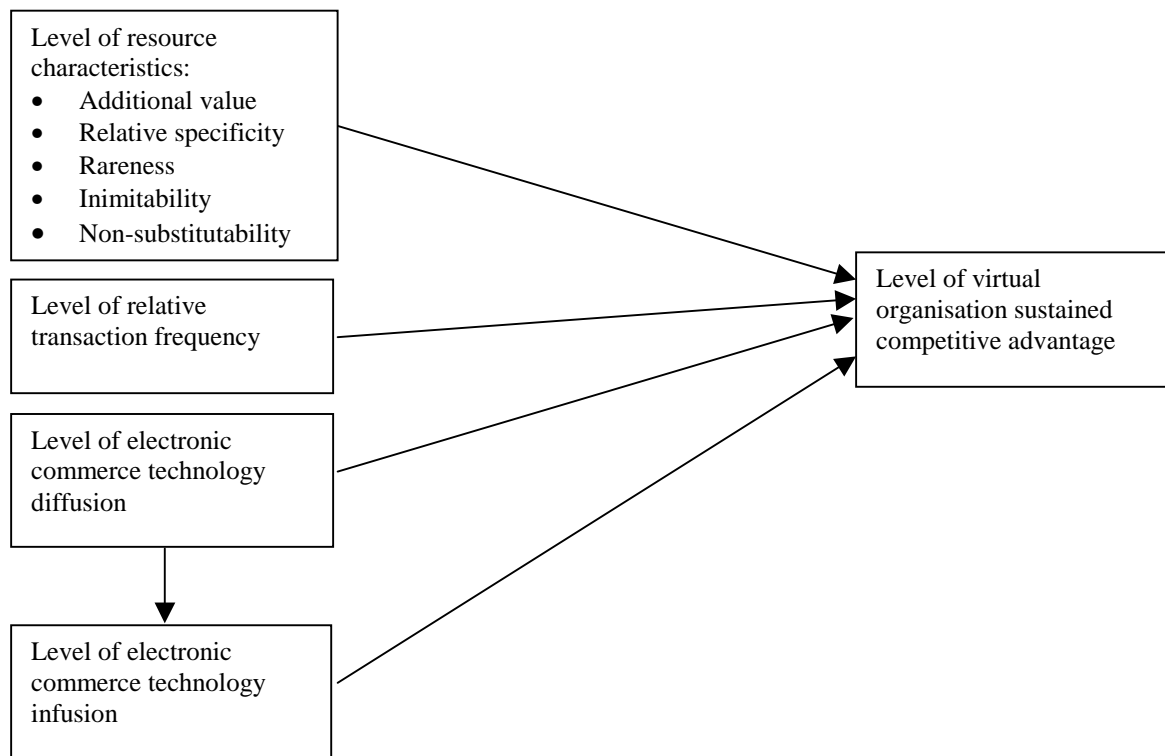


Figure 1: Model of sustained competitive advantage in virtual organisations

The virtual organisation takes many forms, including firms that form a supply chain, firms that are “competitors,” or unrelated firms. The virtual organisation is formed to achieve a particular purpose, but

underlying that purpose is access to additional resources for the firms within the virtual organisation. However, forming a virtual organisation is only one method of accessing additional resources. It is the characteristics of these resources and the transactions they support that determine whether the virtual organisation provides the firms within the virtual organisation with a sustained competitive advantage. The characteristics are resource value, resource specificity, resource rareness, resource inimitability, resource non-substitutability, and transaction frequency.

I predict that a successful virtual organisation is one that provides each firm within the virtual organisation with access to resources of greater value, that is, with resources that allow the individual firm to take advantage of an opportunity or to minimise a threat. The level of resource specificity, rareness, inimitability and non-substitutability, and transaction frequency also affect the sustained competitive advantage of the virtual organisation. Greater levels of these characteristics imply that the virtual organisation is the more-efficient method of accessing the additional resources.

Electronic commerce technology diffusion and infusion are related to the sustained competitive advantage of virtual organisations (see Figure 1). Electronic commerce technology provides the infrastructure to conduct transactions within the virtual organisation. It also enables the firms to cost-effectively access many of the resources of the virtual organisation.

The remainder of the paper is structured as follows. Section 2 outlines the motivation of the paper. The hypotheses are developed in Section 3. Section 4 details the research method to be used to test the model. Section 5 provides the current status of this research project, while section 6 concludes the paper.

2. Motivation

The motivation behind this paper has both practical and theoretical aspects. First, while there is a substantial body of research on electronic data interchange [5], there is as yet little research on virtual organisations. Most of the research on virtual organisations emphasises that they are created to share and combine resources for mutual benefit, but they do not analyse the characteristics or types of resources necessary for virtual organisation sustained competitive advantage [6-8]. Other research focuses on only one potential benefit of a virtual organisation, such as agility, without considering other possible benefits, such as reduced transaction costs [9]. Few of these studies examine small firm virtual organisations. Those studies that have investigated the role of small firm virtual organisations have focused on e-payment systems [7] or Internet marketing networks

[10] rather than resource or transaction characteristics. Most of these studies also suggest that virtual organisations are only temporary networks, rather than sustained relationships [6, 8]. This paper extends the existing literature by examining the characteristics of transactions and resources that drive small firm virtual-organisation sustained competitive advantage.

Small firms are facing threats to their survival from a number of sources. Technological advances, including electronic commerce, are forcing small firms to consider new methods of conducting business. Large firms are increasingly taking market share from areas once dominated by small firms. Consumers have less time to devote to shopping. They are therefore looking for one-stop shopping, usually in the form of a large retailer. All of these threats mean that small firms require strategies to improve or maintain their competitive advantage. Because small firms are often categorised as having limited resources (see [5]) virtual organisations provide small firms with an opportunity to access greater valuable resources. They also allow small firms to compete more effectively with larger competitors. This paper helps small-firm managers to decide whether a virtual organisation is able to improve the prospects of their small firm.

3. Hypothesis Development

The model illustrated in Figure 1 provides the basis for the hypotheses in this paper. To develop the hypotheses, I first discuss the definition of a virtual organisation and demonstrate how the theories of the firm apply to virtual organisations. The remaining sections then develop the hypotheses.

3.1 Virtual organisations

Because the concept of virtual organisations is a relatively new one, there is no precise definition of virtual organisations [8]. Nonetheless, virtual organisations possess a number of common characteristics. First, they are temporary networks of independent companies [8, 11], created for a certain purpose [4]. This purpose is based on sharing resources such as skills, information, and markets between the individual firms of the virtual organisation [6, 12]. In other words, for certain transactions, the individual firms act as a single firm. The other attribute of virtual organisations is extensive use of information technology, especially electronic commerce technologies [6]. Without this technology, the virtual organisation would not be able to co-ordinate its activities effectively and efficiently.

Based on these characteristics, the underlying assumption is that the virtual organisation is a type of firm. Analysing virtual organisations from a firm perspective allows me to draw on theories of the firm to help explain what affects sustained competitive advantage in virtual organisations. The theories used in this paper are

transaction cost economics and the resource-based view of the firm. To maintain a sustained competitive advantage, the resource-based view of the firm posits that firms must control resources that are valuable, rare, imperfectly imitable and imperfectly substitutable [13]. Transaction cost economists believe that the degree of resource specificity and transaction frequency determine the most-efficient governance structure for a particular transaction [14]. Transactions of a recurrent nature supported by high-specificity assets are most efficiently conducted within the firm. These two complementary theories provide the basis for the hypotheses developed in the following sections.

3.2 Relative resource value

As described above, virtual organisations are formed to share resources. In this paper, resources are widely defined to include “all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness” [13]. A resource is valuable when it allows a firm to take advantage of an opportunity or minimise a threat [15]. In other words, a resource that is not valuable to the firm is not a resource [13]. For example, a firm that wants to enter an overseas market requires knowledge of that market. Knowledge is the valuable resource in this case because it allows the firm to take advantage of the market opportunity. This knowledge may exist already within the firm, or the firm may develop that knowledge, purchase the knowledge or join a virtual organisation to access that knowledge.

I hypothesise that virtual organisations are used to access the knowledge – the valuable resource – only when all firms in the virtual organisation obtain access to more valuable resources. The other firms may also desire access to marketing knowledge or the virtual organisation may provide access to different valuable resources. It is not sufficient for one firm to gain access to more valuable resources. These valuable resources may exist already within one of the virtual organisation firms, the resource may result from forming the virtual organisation, or the virtual organisation may develop the resource.

The extent of the sustained competitive advantage depends on the number of valuable additional resources for each firm and how valuable each of those additional resources is to the individual firm. The value of the resource is affected by the costs of developing or accessing the resource, similar resources already controlled by the individual firm, and the importance of the threat or opportunity that the resource addresses. An aggregate measure of additional value for the virtual organisation is obtained by summing the additional total value generated for each firm. This leads to the first hypothesis:

Hypothesis 1: The level of value of the additional resources for all firms in the virtual organisation is positively related to the level of sustained competitive advantage of the virtual organisation.

3.3 Relative resource specificity

Resource specificity (asset specificity) is the extent of specialisation of an asset to a particular transaction. A measure of specificity of a resource is its value in its second-best use. The greater the difference between its value in its primary use and its second-best use, the greater the resource specificity. For example, a railway that only links a mine to a port is a highly specific asset. Its value is close to zero in any other use other than transporting material from the mine to the port. The main types of resource specificity are location specificity, human capital specificity, physical asset specificity, and dedicated assets.

Resource specificity affects what transactions are vertically integrated (conducted internally within the firm) and what transactions are conducted in the market. The greater the resource specificity, the more specialised the governance structures required to protect against opportunism by other parties to the transaction. The most highly specialised governance structure is vertical integration; that is, taking the transaction completely out of the market. This allows the firm greater flexibility in using the highly specific asset and prevents hold-up problems.

According to transaction cost economics, individual small firms exist because they conduct transactions that require highly specific assets. Likewise, I predict that virtual organisations exist because they require highly specific assets for their transactions. What is important to note here is that we have two levels or layers of firms. The virtual organisation itself is one layer, while the small firms of the virtual organisation compose the other layer. The difficulty is how to reconcile the concept of resource specificity when there are two firm layers. I propose that the concept of relative resource specificity resolves the problem. Relative resource specificity is the difference between the level of resource specificity for the virtual organisation compared to the level of resource specificity for the individual firm for a comparable resource.

For example, one computer consultant may have general knowledge of databases, but another consultant may have more specific database knowledge of one particular database management system, such as Oracle. If the general consultant has some clients or potential clients using Oracle databases, they are likely to benefit from the more specialised knowledge of the Oracle database consultant. However, on transactions not involving Oracle databases, the Oracle consultant is not required. The virtual organisation is the appropriate governance structure in this case, because of the positive relative resource specificity. The Oracle specialist must also

experience positive relative resource specificity. This positive relative resource specificity is not necessarily based on the same asset; that is, Oracle database knowledge. The general database consultant may have more highly specific database design knowledge than the Oracle consultant.

Applying the reasoning of the above example to the broader case of virtual organisations, all firms within the virtual organisation must demonstrate positive relative resource specificity. Without positive relative resource specificity for all firms, the virtual organisation is not the most appropriate governance structure and is unlikely to achieve a sustained competitive advantage. Also, comparable assets of higher specificity reduce costs or provide other benefits to the individual firm, improving the competitive advantage of the virtual organisation.

To determine the level of relative resource specificity, the specificity of the firm resources is compared with the specificity of equivalent resources controlled by the virtual organisation (the other firms in the virtual organisation). The relative specificity of the resources is summed for each firm and then summed for the virtual organisation to calculate the aggregate relative resource specificity for the virtual organisation. The extent of the sustained competitive advantage is related to the level of aggregate relative resource specificity.

3.3.1 Resource value and resource specificity

The concept of relative resource specificity complements and extends the concept of valuable resources discussed in section 3.2 above. Resource value and resource specificity are inter-related because highly specific resources are often valuable resources for the particular firm. However, their separate inclusion in the model is justified because they affect sustained competitive advantage differently. Resource-based economics suggests that a firm must control valuable resources to achieve a sustained competitive advantage but does not provide guidance on the method of resource control. Resource specificity, drawn from transaction cost economics, provides the basis for determining the method of resource control. The sustained competitive advantage of the virtual organisation therefore depends on both the level of additional resource value and positive relative resource specificity.

3.3.2 The virtual organisation as a hybrid governance structure

The previous discussion proposes that the virtual organisation is a second firm layer above the individual small firms. An alternative transaction cost view of considering virtual organisations is that they are merely one type of hybrid governance structure, falling somewhere in between a purely market transaction at one end of the spectrum and vertical integration at the other end of the spectrum. Applying this theory to virtual organisations leads to the prediction that virtual organisations are only appropriate for transactions of moderate specificity,

from the individual small firm's perspective. The concept of relative resource specificity accommodates and extends this alternative view.

A virtual organisation is only one type of hybrid governance structure that is available for moderate specificity transactions. I suggest that aggregate relative resource specificity is one method of testing whether a virtual organisation is the most appropriate governance structure. If there is no increase in the aggregate level of specificity across all or most firms within the virtual organisation, then another hybrid structure is more appropriate.

Transactions of very high specificity for the individual firm are unlikely to exhibit positive relative resource specificity. If resource specificity is already at a high level, the virtual organisation is unable to further increase resource specificity. The alternative perspectives are therefore complementary with respect to high specificity transactions.

Finally, transaction cost economics predicts that transactions of low resource specificity are most efficiently conducted in the market. The concept of relative resource specificity does not contradict this prediction. If the virtual organisation does not provide the individual firm with a more specialised asset to accomplish the transaction, the individual firm continues to conduct this transaction in the market. However, if the virtual organisation is able to provide the firm with a more highly specialised asset that increases the efficiency and effectiveness of transaction performance, then the transaction is conducted in the virtual organisation, increasing the competitive advantage of the virtual organisation. For example, a solicitor may employ a legal secretary while an accountant employs only a general secretary. The accountant would probably benefit from the more specialised legal secretary, but could probably not afford to employ one full-time. If both firms joined a virtual organisation, the accountant could gain access to the more highly specific resource, the legal secretary. Note again that the accountant must also provide the solicitor with a more highly specific resource, such as accounting information.

To summarise, the sustained competitive advantage of the virtual organisation is affected by resource specificity because the virtual organisation is only one method of accessing valuable resources. The virtual organisation is the efficient governance structure when there exists positive relative resource specificity for all firms within the virtual organisation. This leads to the second hypothesis:

Hypothesis 2: The level of aggregate relative resource specificity is positively related to the level of sustained competitive advantage of the virtual organisation

3.4 Resource rareness, inimitability, and non-substitutability

The rareness of a resource relates to how many firms control that resource. A sustained competitive advantage requires resources that are currently rare, but also are incapable of future imitation or substitution. Imitation refers to developing or otherwise obtaining the same resource, while substitution denotes using a different resource that is strategically equivalent to the resource it is substituting. The greater the current abundance of the resource, the less likely the resource is a source of sustained competitive advantage [13]. Additionally, if other firms are able to replicate the resource, now or in the future, the resource is not a source of sustained competitive advantage.

The sustained competitive advantage of the virtual organisation is related to the rareness, inimitability, and non-substitutability of the resources that it controls. At an individual firm level, this implies that the extent of the sustained competitive advantage depends on the rareness, inimitability, and non-substitutability of the additional resources. If the individual firm does not obtain additional resources to improve the firm's competitive advantage, then neither does the virtual organisation enjoy a sustained competitive advantage.

Another perspective is that rare, inimitable, and non-substitutable resources, by definition, are difficult to obtain, and collaborating with other firms within the virtual organisation may be the only method of accessing the resources. This increases the reliance on the virtual organisation. As a result, these resources affect the sustained competitive advantage of the virtual organisation. This discussion leads to the following hypotheses:

Hypothesis 3: The level of rareness of the additional resources for all firms in the virtual organisation is positively related to the level of sustained competitive advantage of the virtual organisation.

Hypothesis 4: The level of inimitability of the additional resources for all firms in the virtual organisation is positively related to the level of sustained competitive advantage of the virtual organisation.

Hypothesis 5: The level of non-substitutability of the additional resources for all firms in the virtual organisation is positively related to the level of sustained competitive advantage of the virtual organisation.

3.5 Relative transaction frequency

The preceding hypotheses related to resource characteristics. The characteristics of transactions performed within the virtual organisation also affect the sustained competitive advantage of the virtual organisation. A transaction occurs "where a good or service is transferred across a technologically separable interface" [16]. Based on this definition and for the purposes of this study, a transaction is defined as any activity between two

firms. Examples of transactions within the virtual organisation include exchanging information, supplying component parts, or the provision of accounting services to all firms in the virtual organisation. One important characteristic of transactions is transaction frequency. The frequency of a transaction is simply how often it is performed.

According to transaction cost economics, high-frequency transactions are more efficiently conducted within the firm because they justify the investment in high-specificity assets [16]. This is because the firm is able to take advantage of economies of scale and use specific assets to their full capacity [17]. The relevance of transaction frequency to virtual-organisation competitive advantage is that small firms, in isolation, are unable to justify investments in specialised resources because of low transaction frequency. The small firm is unable to recover the production costs of the investment. The virtual organisation, by combining the similar needs of a number of small firms, increases the frequency of the transaction, justifying the higher specificity assets discussed in section 3.3. For example, a virtual organisation composed of local fruit shops may employ a specialised customer-relations consultant to train their employees. This high-specificity asset (the consultant) is not a viable investment for only one firm because of the lack of transaction frequency.

As with resource specificity, it is the relative transaction frequency that affects the sustained competitive advantage of the virtual organisation. Relative frequency is the frequency of a transaction performed by the virtual organisation compared to the frequency of the transaction performed by each of the individual firms. Aggregate relative transaction frequency is the relative transaction frequency for the virtual organisation. It is the sum of the relative transaction frequencies for each firm. The greater the aggregate relative transaction frequency, the greater the benefits to the virtual organisation and hence the greater the sustained competitive advantage of the virtual organisation. This reasoning leads to hypothesis six:

Hypothesis 6: The level of aggregate relative transaction frequency is positively related to the level of sustained competitive advantage of the virtual organisation.

3.6 Electronic commerce technology diffusion

Electronic commerce technologies, such as local area networks, the World Wide Web, e-mail, and GroupWare enable virtual organisations to function effectively. I include both software (e.g. GroupWare) and hardware (e.g. modems) in the definition of electronic commerce technologies. Without electronic commerce technologies, many transactions within the virtual organisation are not cost-effective. Moreover, in many cases, resource

sharing is not feasible. For example, a virtual organisation comprised of tourist-dependent firms within a particular geographic region may form to share timely information on tourist numbers and characteristics. The virtual organisation members are then able to tailor their products and services to the particular tourists in the area at that time. To collate and distribute this information in a timely and cost-effective manner requires electronic commerce technology such as a secure Web site or regular e-mail updates. Other examples include on-line ordering of related products from the virtual organisation, a virtual organisation Web site for customers, electronic payments and traditional EDI functions.

The effectiveness of the electronic commerce technology depends on all firms within the virtual organisation acquiring the technology. I predict that virtual organisation competitive advantage is therefore also a function of how widespread (diffused) the electronic commerce technology is across the virtual organisation. If not all firms within the virtual organisation adopt the technology, its effectiveness is limited. Those firms not adopting similar technology require other means of communicating and transacting, increasing transaction costs and the possibility of communication errors. Co-ordination between firms is also more difficult, increasing the costs of the virtual organisation and therefore diminishing the competitive advantage of the virtual organisation. This leads to the following hypothesis:

Hypothesis 7: The level of electronic commerce technology diffusion is positively related to the sustained competitive advantage of the virtual organisation.

3.7 Electronic commerce technology infusion

The acquisition and installation of the technology is a necessary but not sufficient condition for virtual organisation sustained competitive advantage. The technology is only productive once it is used [18]. Effective use of the technology only occurs when it is infused into the firm. Information technology infusion is the “extent to which the full potential of the innovation has been embedded within an organisation’s operational or managerial work systems” [19]. In other words, the benefits from implementing electronic commerce technology accrue when the technology is incorporated into the operations and management of the firm.

The reliance of virtual organisations on electronic commerce technologies means that technology infusion affects the sustained competitive advantage of the virtual organisation and leads to the hypothesis:

Hypothesis 8: The level of electronic commerce technology infusion is positively related to the sustained competitive advantage of the virtual organisation.

The other relationship predicted in the model is the relationship between electronic commerce technology diffusion and electronic commerce technology infusion. I predict that for electronic-commerce technology infusion to occur, the electronic-commerce technology must first be diffused across the virtual organisation. [20]. The benefits from using the electronic-commerce technology are not realisable without all firms adopting it. For example, installing GroupWare software provides minimal benefit if no other firm uses it. It is therefore unlikely that firms embed this technology into their operations unless other firms in the virtual organisation adopt the technology. This leads to the final hypothesis:

Hypothesis 9: The level of electronic commerce technology diffusion is positively related to the level of electronic commerce technology infusion

4. Research Methodology

A case-study approach will be used to test the hypotheses developed in section 3. The case-study approach is appropriate due to the complex nature of the variables and inter-relationships between those variables. The firms forming the basis of the case study are currently participating in a Queensland Department of State Development initiative to increase the awareness and use of electronic commerce technologies among small firms. These firms have shown interest in using electronic commerce technologies and in forming virtual organisations.

5. Current project status

I am currently developing empirical measures for the variables outlined in the model. These measures will mainly take the form of questions delivered in structured interviews with the project participants. Further information will be obtained from meetings with the Queensland Department of State Development and their consultants. These multiple information-gathering techniques will provide a more objective representation of virtual organisations and the factors that drive their sustained competitive advantage. Preliminary results derived from the interviews and other information sources will be presented at the conference.

6. Conclusion

This paper presents a model of sustained competitive advantage in virtual organisations. It attempts to identify the transaction, resource, and technology characteristics that are likely to impact on the success of the virtual organisation. A case-study approach will be used to test the hypotheses. Hopefully, this research will provide

practitioners with a framework for assessing when a virtual organisation is likely to achieve a sustained competitive advantage.

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