VERTICAL INTEGRATION TOWARDS DIFFERENT SOURCES OF RAW MATERIAL

John R. Isaksen, Bent Dreyer and Kjell Grønhaug*

Norwegian Institute of Fisheries and Aquaculture Research, N-9291 Tromsø
Tel: +47 77 62 90 00, E-mail: john-roald.isaksen@fiskforsk.norut.no
*Norwegian School of Economics and Business, N-5045 Bergen
Tel: +47 55 95 94 60, E-mail: kjell.gronhaug@nhh.no

ABSTRACT

Vertical integration (VI) is a frequently applied strategy to secure adequate and timely supply believed to influence firms' performance. Empirical findings are, however, so far inconclusive. It has been suggested that the ambiguous results may be due to factors such as variations in uncertainty developments in the industry studied. This paper develops two theory-driven hypotheses related to primary uncertainty and industry age (life cycle) respectively. The hypotheses are tested within the Norwegian fish processing industry, a research setting characterised by variety in both uncertainty and age. We find that the traditional part of the industry, which demonstrate a greater element of primary uncertainty, has to a larger extent than the younger processing industry, which utilises farmed fish, employed VI as a strategic tool in securing the raw material supply. Further, VI seems to have minor impact on performance in both young industries and industries exposed to high degree of "state of nature" uncertainty.

Key words: *Primary uncertainty, industry age, vertical integration and performance*

1. INTRODUCTION

Firms need adequate and timely supply of input factors to operate effectively. This follows from the input – throughput – output paradigm which states that firms' value creation is brought about by transforming input factors into valuable products and services offered in the output markets. If the market for input factors was "perfect", supply would be no problem and input factors bought in the market. The input factor market may, however, be imperfect, e.g. consisting of one or a few suppliers only. The market for input factors may also be imperfect due to various types of environmental uncertainty (see Sutcliffe & Zaheer, 1998 and Miller & Shamsie, 1999 for recent reviews). One type of environmental uncertainty is what Sutcliffe and Zaheer denotes "primary uncertainty", i.e. uncertainty related to "state of nature". For example, some firms depend on input factors where the supply is almost stochastic, which has attained limited attention in earlier. Here we make an effort to remedy this neglect in the past.

Vertical integration (VI) is a frequently applied strategy to secure adequate and timely supply, assumed to influence firms' performance. Empirical research is, however, so far inconclusive as some studies report positive co-variation between degree of VI and performance, some no relationship while other report negative co-variation between VI and performance (Buzzel, 1983; Stuckey & White, 1993; Dreyer *et al.*, 2001).

In this study we report findings from a study on VI towards two dissimilar sources of raw material – farmed and wild fish. The industry studied is the Norwegian fish processing industry. The degree of VI towards these sources is explored, and the impact on performance is reported. Thus our focus is on upstream supply with fish processing as the focal industry. Our

findings indicate that fish farmers have integrated downstream and built their own processing plants. Traditional fish processors, however, tend to integrate upstream towards the fishing fleet rather than towards fish farms, and produce next to no farmed fish. We propose different explanations for this development, and discuss how our results may contribute to explain the ambiguous empirical findings reported in the VI literature. In addition we propose explanations to how primary uncertainty may influence VI as well as how to secure supply when such uncertainty is persistent.

2. VERTICAL INTEGRATION

Vertical integration implies that transactions are conducted internally instead of using the market. VI has received considerable attention in research literature, mainly because it is a frequently implemented strategy in many firms and industries. Vertical integration relates to imperfect markets, because under the condition of perfect competition it (VI) has no place. In explaining VI, three perspectives dominate: Transaction cost economics, industrial organisation and strategic management.

The transaction cost economics approach (TCE) provides a coherent framework for investigating the determinants of VI (Coase, 1937; Williamson, 1971, 1975 and 1985). Arrow (1969) defines transaction costs as being *the cost of organising the economic system*. Minimising costs that arise, due to transaction specific investments and uncertainty, impact greatly the way production is organised. Transactions are classified according to whether they take place within the firm or are conducted across markets. The market alternative becomes hazardous in recurring exchanges involving transaction specific capital when information is incomplete. In such cases the firm provides a suitable alternative since common ownership of physical capital discourage opportunism among

2

owners, and is the basis of efficient information transfer and long-term ties in the firm and between its employees. In terms of vertically related production processes, the firm will integrate when the transaction costs outweigh internal costs of management (Coase, 1937; Levy, 1985).

According to the industrial organisation (IO) perspective, VI is a valuable instrument in creating competitive advantage. Porter (1980) argues that the strategic purpose of VI is to utilise different forms of economies, (combined operations, internal control and co-ordination, information, avoiding the market, and stable relationship). Additionally, Porter argues, as do Pfeffer & Salancik (1978), that VI is an important device for reducing external uncertainty and securing supply of critical input.

The resource-based view of the firm (RBV) approaches VI as mainly a differentiation issue (Wernerfelt, 1984; Ramanujam & Varadarajan, 1989; Miller & Shamsie, 1996), and focuses on firm specific resources prior to - and after - integration. To have the potential of sustained competitive advantages firm resources must be valuable, rare, imperfectly mobile, and nonsubstitutable (Barney, 1991).

The three perspectives have different foci. TCE emphasises that vertically integrated firms may have lower costs than do firms utilising the open market. IO emphasises VI as a strategy to achieve competitive advantages and concentrate on industry specific competitive environment as a major moderator on VI impact on performance. The RBV focuses on firm specific resources, stating that VI is a complex and costly strategy.

An often-used typology within organisational ecology is the distinction between "specialists" and "generalists" (Hannan & Freeman, 1977; Carroll, 1984), or other strategic groups. This applies also within some fields of

strategy literature (McGee & Thomas, 1986; Thomas & Venkataraman, 1988). Miles & Snow (1978) distinguish between "prospectors", "reactors" and "defenders", where the first mentioned on their continuous search for market opportunities generate changes and uncertainty in the industry. Comparisons between strategic groups when VI is concerned are not straightforward, as different firms may compete in different markets, have different historical development and be in different phases of their life cycle. In an earlier paper (Dreyer *et al.*, 2001) we discuss measurement problems in greater detail, and propose ways to overcome them, (i.e. VI as a continuous variable according to de Koning (1994)).

In later years, a greater interest is taken to Industrial Network Theory, outlining the significance of networks as basis for contractual co-operation and as an intermediate state between pure market transactions and VI. As many manufacturers invest in links to external sellers from which they buy specialised inputs, networks are formed (Kranton & Minehart, 2000). This becomes visible, when in demand for input factors uncertainty prevails. Afuah (2001) states that *firm boundaries are dynamic, not static*, and that technological changes can outclass former organisational adaptations to supply (i.e. VI, alliances or market transactions), as supply conditions shift the rationale for the firms. The "in-house" or "through market" decision is made on account of which makes the most efficient generation and exploitation of knowledge (*op. cit.*).

Another theory development in how to explain the "*make or buy*" decision is by the means of *trust,* and it's role in transactions between buyer and seller. Trust, together with other explanatory forces in this relationship, clearly affects the terms of trade between economic actors. From being cited in support of "tacit collusion", trust is now regarded crucial in

4

situations with great behavioural risk, (see Dulsrud (2001) for a recent review).

Although conceptual issues concerning VI have received much attention, predictions of VI and its impact on performance within an industry are rather equivocal.

It has been suggested that factors such as industry structure, degree of uncertainty, and product life cycles may impact both the degree of VI, and on the relationship between VI and performance (Hennart, 1982; Stuckey, 1983; Martin, 1986; Joskow, 1988). However, few studies have tested such assumptions empirically. This paper report an effort to do so, in an industry environment where firms are heterogeneous in terms of both operational control (i.e. stage of the value chain) as well as age and degree of uncertainty.

3. HYPOTHESES

According to the research literature, structure and turbulence in firms' competitive setting affect the degree of VI (Pfeffer & Salancik, 1978; Balakrishnan & Wernerfelt, 1986; Stuckey & White, 1993). When uncertainty is at stake, firms cultivate either VI or market based transactions as strategies for organisation structure (Masten, 1984; Williamson 1991). According to Pfeffer & Salancik (1978) a firm in an open system will have to secure vital resources that enter the production process. When such resources are external, this uncertainty has to be controlled, and VI is one - and often implemented - strategy in this sense. Miller & Shamsie (1999) point out that environmental state uncertainty (cf. primary uncertainty) spurs product variety and may induce firms to new product innovations and broader market scope. Balakrishnan & Wernerfelt (1986) concluded in their analysis that great environmental uncertainty

would invoke VI as strategy to avoid this. However, if the uncertainty was of technological nature, the end result would be the opposite. Based on this literature we hypothesise that:

H1: Degree of VI towards raw material is positive correlated with the degree of uncertainty in raw material supply

Industries are created and they develop. Over time they move through stages from being emergent, to growing, maturing and declining (see e.g. Porter (1980)). According to the life cycle theorem (Stigler, 1951; Adleman, 1955; Tucker & Wilder, 1977; Langlois & Robertson, 1992) VI will be adapted to a larger extent among firms in young industries, while the level of VI will decrease as the industry develops. More specific, in a fast growing industry the providers of input factors will not grow rapid enough to satisfy the needs of the producers, which in time will generate a necessity to integrate upstream (Adleman, 1955). Thus, our second hypothesis:

H2: Degree of upstream VI in young industries will be higher than in more mature industries

In the next sections design and data chosen in order to test these hypotheses will be described.

4. RESEARCH DESIGN

Our study is limited to a single industry with the firm as focus. A prime reason for focusing on one industry only is to eliminate for the so-called industry effect, i.e. variation across industries that may affect the phenomenon to be explained, as recommended by Casson (1984). Joskow (1988) recommends that all studies of VI must be based on industry specific knowledge of firm structure, production and products in the analysed setting. Our motive is to establish a relationship between degree

of VI and performance. Literature reviewed suggests both industry age and uncertainty as heavy moderators of the effect of VI on performance. Thus, this is operationalised through the firms' choice of input factors. This is our conceptual model. The chosen population must therefore meet two prerequisites to allow for testing the stated hypotheses. First, the firms within this industry must have access to alternative sources of raw material. Second, the industry studied must consist of firms that are heterogeneous as far as VI towards the alternative raw material sources is concerned, in order to account for the needed variation in degree of uncertainty, supply and stages of historical development. These are the variables we have limited our study to. An industry meeting these claims is the fish processing industry in Norway, which we study here. Moreover, data at firm level is needed to test the first hypothesis.

4.1. Setting

The industry studied has evolved over many hundred years, and has based its production on catches at sea. The last twenty years, however, a new alternative source of supply has emerged on the raw fish market - namely farmed fish. Uncertainty in supply from farmed fish is far less compared to the traditional harvesting of wild fish.

The traditional processing industry is exposed to high levels of uncertainty in supply of raw material, due to seasonal harvesting where biology, abundance and markets matter (Dreyer, 1998). Therefore, downstream VI towards the fishing fleet is considered an alternative strategy for controlling the most important input factor (Dreyer *et al.*, 2001). Institutional barriers, i.e. legislation securing vessel ownership to active fishermen, have, however, to some extent reduced implementation of this strategy.

Fish farming is a rather young industry in Norway. The emerging of this

raw material source has taken place at the same time as traditional processing industry has sought ways to overcome its volatile raw material supply. Farmed fish could enter this production process with few institutional or technological obstacles. Though, instead of exploiting this new input factor in the traditional fish processing industry, fish farmers have integrated downstream by establishing processing plant for this raw material alone. Here we try to shed some light over this apparent puzzle.

4.2. Data

As argued above, the industry is well suited for testing our hypotheses. The data originate from "Driftsundersøkelsen i Fiskeindustrien", a yearly, ongoing profitability survey (Bendiksen, 2001). Since the same companies are surveyed each year, the data allows for the construction of a panel data set. The survey provides the main accounting and production figures at firm and industry level, and allows for comparisons of performance among different strategic groups. The data is well suited for developing continuous measurements on degree of VI. Available performance measures for every firm also makes it possible to map the firms' relative competitive position every year. Additionally, telephone interviews were conducted with general managers in the industry, focusing on VI issues towards both wild and farmed fish. The telephone interview data was collected in order to test empirically the way uncertainty and stage of life cycle impact the degree of upstream VI, together with the impact of VI on performance. The shorter life span of fish farming compared to wild catches also allows for testing of the life cycle hypothesis.

4.3. Measurements

As recommended in literature, we have emphasised the need for continuous measurements of VI adjusted to the industry studied (Eckhard, 1979;

Martin, 1986; de Koning, 1994). We also analyse the magnitude of firms in the total population that process farmed fish, in order to study structural issues in the population, like specialisation and division of labour. However, this only captures the differentiation dimension of VI as emphasised in the RBV. Therefore, ownership is incorporated as a crucial dimension of VI, and two measures of ownership are constructed, i.e. share of processing plants owning fishing vessels (**VI1**) and share of processing plants owning fish farms (**VI2**). A third dimension is to what degree the processing plants are supplied with raw material from units they own. The next two variables therefore capture the share of total raw material supply stemming from vessels or fish farms where the processing plants have proprietary interests, in order to establish systematic differences in adaptation of VI between the strategic groups: **VI3** measures the share of supply from own vessels, and **VI4** captures the share from own fish farms.

Our data include financial statements, and are well suited for measuring financial performance. To assess performance we have applied two financial key figures: the rate of EBT (Earnings Before Tax) to turnover and Return on Total Capital (RTC).

4.4. Empirical hypotheses

Due to different levels of underlying uncertainty in the two distinct raw material bases we predict the degree of VI to be higher towards wild fish than farmed fish (see H1). On the other hand, wild fish has been available to the processing industry for ages, while farmed fish has only been available for a few decades. According to the life cycle theorem a higher degree of VI towards farmed fish than towards wild fish can be predicted (c.f. H2). This contradiction emphasises the need to test this empirical. The setting and design chosen here allows for comparing the importance of the

two theorems. In proposing our empirical hypotheses we have emphasised the uncertainty theorem, and accordingly we predict:

EH1: VI1 to outweigh VI2

EH2: VI3 to outweigh VI4

Important parts of our study focus on the impact of VI on performance. In order to test this we apply the variables VI3 and VI4 to capture levels of VI. We predict that the impact of VI will be as argued earlier, i.e. that degree of VI is positively correlated to economic results, and that among those processing wild fish, VI towards the fishing fleet occur more often than farmed fish processors integrating towards fish farms. Our empirical hypotheses concerning impact on performance are:

EH3: There is a positive correlation between VI and performance

EH4: The correlation between economic performance and VI is higher towards wild fish than towards farmed fish

Another test, made possible by our data, is to analyse performance among different adaptations to different sources of supply. Three strategic groups will here be compared – **Specialist 1**; **S1** (i.e. process only wild fish), **Specialist 2**; **S2** (i.e. process only farmed fish) and **Generalist**; **G** (i.e. process both farmed and wild fish). In this way we are able to incorporate and refine our findings further on strategic groups.

5. FINDINGS

In the year of 2000 there was about 550 fish processing units in Norway. The number of producers included in the annual profitability study was about 450, due to lacking account figures, varying company constellations, etc. With regards to raw material, about 60 % of the firms make use of caught whitefish, 20 % farmed salmon or trout and about 5 % both wild

and farmed fish. The remaining firms utilise pelagic species or crustaceans (mainly shrimp). As about 80 % of all farmed fish are exported round, only 36 % of those who handle farmed fish process the fish further than merely slaughtering and packing. In the following we treat those who process both wild and farmed fish as a distinct strategic group (**G**), when testing the empirical hypotheses.

To test our first hypothesis, two empirical hypotheses were specified (EH1 and EH2). Inspecting our data show that proprietary interests in fishing vessels are employed to a higher degree than in fish farms, (**VI1>VI2**). Of all the units in the industry, 20 % has ownership in fishing vessels, while only 8 % own shares in fish farms. Hence **EH1** is confirmed. In addition, three firms have proprietary interests in both fishing vessels and fish farms.

Table 1 shows that the group S1 receives on average 16 %, S2 78 % and G 30 % of their annual raw material supply from vessels and fish farms they own. Hence **EH2** is rejected, as wild fish processors do not obtain more raw materials from VI units than those processing farmed fish, (**VI3<VI4**). Another conclusion is that there is a significant difference in degree of VI between the groups, as shown by the *t-value* in the last column of Table 1.

Table 1   Degree of VI in – and between – three strategic groups; S1 processing only wild fish, S2 processing only farmed fish and G processing both farmed and wild fish

t-test	VI			
	N	Mean	St.dev	t-value
S1 – S2	57	16.087	20.137	-8.85*
S2 – G	21	78.048	29.661	-5.27*
G – S1	19	29.737	28.287	-2.30*

*) Significance level < 0.01

Table 2 reports the test results from the impact of VI on performance within the industry, i.e. test **EH3** by means of the three strategic groups. By

11

taking the above information into account, Table 2 also indicates that there is seemingly no impact of VI on performance within this industry (between **VI3** and **VI4** and EBT/Turnover and RTC). This conclusion holds for all groups and both performance measures. Hence, **EH3** is rejected.

Table 2 VI and performance in strategic groups

Sample	EBT/Turnover			RTC		
	β	σ	R^2	β	σ	R^2
S1 (n=57)	-0.012	0.001	0.002	0.064	0.098	0.008
S2 (n=21)	0.038	0,101	0.008	-0,040	0.123	0.006
G (n=19)	0.085	0.055	0.119	0.036	0.131	0.004

As fish processing firms operate in an utterly dynamic setting, as well as we have argued for a life cycle approach to the problem, we expand our test for a series of three years. Table 3 reports the test results from whether differences in performance among the three strategic groups are present for the years 1998-2000. This in order to secure validity in our findings through testing for a subsequent series of years *between* the groups, and to comply with the recommendations of Casson (1984) that studies of variation of VI within an industry should be carried out over time.

Table 3 Degree of VI and influence on performance in strategic groups, 1998-2000

t-test		EBT/Turnover			Return on Total Capital		
		Mean	Stdev	t-value	Mean	Stdev	t-value
2000	**S1** – S2	-0.0217	0.058	-1.51	0.0249	0.148	-1.29
	S2 – G	0.0232	0.131	-0.10	0.0768	0.160	-0.10
	G – S1	0.0200	0.070	-2.36*	0.0720	0.153	-1.17
1999	**S1** – S2	-0.0191	0.074	-1.83	0.0381	0.153	-0.99
	S2 – G	0.0328	0.121	-1.07	0.0863	0.202	-0.50
	G – S1	0.0029	0.037	-1.69	0.0625	0.078	-0.89
1998	**S1** – S2	0.0493	0.053	1.73	0.2101	0.193	3.02*
	S2 – G	-0.0067	0.137	0.16	0.0046	0.273	1.14
	G – S1	-0.0012	0.070	2.86*	0.0777	0.064	4.41*

*) Significance level < 0.01

As can be seen from Table 3 no overall significant differences in performance between the strategic groups can be found even when the period study was enlarged. However, an exceptional good year in the white fish (**S1**) branch in 1998 leads to significant better results in this group than among generalists (**G**) that year. Significant better than those who only process farmed fish (**S2**), as well, when return on total capital is in question. Further tests on these relationships reveal that changes in margins at product level imply heavier impact on performance than VI.

6. CONCLUDING REMARKS

Our findings indicate that the impact of VI on performance is minor both in young industries and industries with heavily fluctuating supply of raw material. The spread and degree of VI seems to be highest in the youngest part of the industry (i.e. farmed fish) and lowest in the oldest part (i.e. wild fish), that processes from the most volatile raw material source. The direction of VI varies, as downstream VI dominates in the young and stable supply industry, whilst upstream VI dominates in the old and uncertain supply part. These findings support the life cycle theorem, whilst less support is found for the uncertainty theorem.

This study has emphasised the importance of focusing on how to measure VI. In the setting studied we have demonstrated high degree of VI at firm level among the farmed fish processors. However, when focusing on VI at industry level, we observe that most of the farmed fish are sold unprocessed to foreign actors, and that the fish farming industry is severely integrated towards the wholesales market. This indicates low degree of VI at industry level, but high degree of VI among the few existing processors of farmed fish in Norway. Further, it emphasises the need for thorough knowledge to the industry studied, as measurements on different stages in

the value chain – even at different industry levels – can result in spurious regressions and, hence, wrong conclusions.

Our findings give support to the RBV focus on VI as mainly a differentiation issue. Although the older part of the fish processing industry were given the opportunity to integrate towards a new and stable raw material source, our findings indicate that they did not seize this possibility. In stead, history indicates that the industry has separated into two directions: one specialising in processing wild fish and the other farmed.

Additionally the RBV may also contribute to a better understanding of the contradicting empirical results concerning impact of VI. Obvious, some firms experience positive pay-off from VI, while other, in the same setting and period of time, experience negative pay off from VI. This indicate that in order to obtain a better understanding of the impact of VI on performance, the portfolio of other firm specific resources must be included in further studies of this impact.

An indication of new directions of further research on VI might be found among the answers given by top managers in the established processing plants on the question why they did not take the opportunity to integrate towards farmed raw material. According to them this was not connected to technical, institutional or competence barriers, but rather to profitability concerns. Due to high prices on raw material and strong global competition on farmed fish, the profits among farmed fish processors, as shown in Table 3, has been rather low and for long periods losses have been substantial in this part of the industry. This indicates the need for focusing on profitability concerns when considering VI.

REFERENCES

Adleman, M.A. (1955) Concept and statistical measurement of vertical integration, *Business Concentration and price policy*, Princeton University Press*,* Princeton New Jersey, National Bureau of Economic Research, pp. 281-330.

Afuah, A. (2001) Dynamic boundaries of the firm: Are firms better off being vertically integrated in the face of a technological change?, *Academy of Management Journal*, 44(6), pp.1211-1228.

Arrow, K.J. (1969) The organisation of economic activity, *The analysis and evaluation of public expenditures: The PBS System*, Joint economic committee, U.S. Government Printing, Washington.

Balakrishnan, S. & Wernerfelt, B. (1986) Technical changes, competition and vertical integration, *Strategic Management Journal*, 7(4), pp. 347-359.

Barney, J.B. (1991) Firm resources and sustained competitive advantage, *Journal of Management*, 17(1), pp. 99-120.

Bendiksen, B.I. (2001) *Driftsundersøkelsen i fiskeindustrien, oppsummering av inntjening og lønnsomhet i 2000* (in Norwegian), report no. 15, Fiskeriforskning, Tromsø.

Buzzel, R.D. (1983) Is vertical integration profitable, *Harvard Business Review*, 61(1), pp. 92-102.

Carroll, G.R. (1984) The specialist strategy, *California Management Review*, XXVI (3), pp. 126-137.

Casson, M. (1984) The theory of vertical integration: A survey and synthesis, *Journal of Economic Studies*, 11(2), pp. 3-23.

Coase, R.H. (1937) The nature of the firm, *Economica*, 4(nov), pp. 386-405.

de Koning, J.A. (1994) Survival of the fittest or the fitting? A framework for integration, *Journal of Strategic Change*, 3(5), pp. 281-286.

Dreyer, B. (1998) *Kampen for tilværelsen - et studium av overlevelsesstrategier i fiskeindustrien*, (in Norwegian), Dr. scient. thesis, Norwegian College of Fishery Science, University of Tromsø.

Dreyer, B., Isaksen, J. and Grønhaug, K. (2001) The art of vertical integration – Profitability considerations in Stefanusson, G. and

Tilanus, B. (eds.), *Collaboration in Logistics – Connecting Islands Using Information Technology*, Department of Transportation and Logistics, Chalmers University of Technology, Gøteborg.

Dulsrud, A. (2001) *Tillit og transaksjoner - En kvantitativ analyse av kontraktsrelasjoner i norsk hvitfiskeksport*, (in Norwegian) Dr. polit. thesis, Department of Sociology and Human Geography, University of Oslo.

Eckard, E.W. jr. (1979) A note on the empirical measurement of vertical integration, *Journal of Industrial Economics*, 28(1), pp. 105-107.

Hannan, M.T. & Freeman, J. (1977) The population ecology of organizations, *American Journal of Sociology*, 82(5), pp. 929-964.

Hennart, J.-F. (1982) *A theory of multinational enterprise*, University of Michigan Press, Ann Arbor, MI.

Joskow, P. (1988) Asset specificity and the structure of vertical relationships; Empirical evidence, *Journal of Law, Economics and Organization*, 4(1), pp. 95-117.

Kranton, R.E. & Minehart, D.F. (2000) Networks versus vertical integration, *RAND Journal of Economics*, 31(3), pp. 570-601.

Langlois, R. & Robertson, P. (1992) Explaining vertical integration: Lessons from the American automobile industry, *Journal of Economic History*, 49(2), pp. 361-375.

Levy, D.T. (1985) The transaction costs approach to vertical integration: An empirical examination, *Review of Economics and Statistics*, 67(3), pp. 438-445.

Martin, S. (1986) Causes and effects of vertical integration, *Applied Economics,* 18(7), pp. 737 -755.

Masten, S.E. (1984) The organisation of production: Evidence from aerospace industries, *Journal of Law and Economics*, 27(2), pp. 403-417.

McGee, J. & Thomas, H. (1986) Strategic groups: Theory, research and taxonomy, *Strategic Management Journal*, 7(2), 141-160.

Miles, R.E. & Snow, W. (1978) *Organizational strategy, structure and process*, McGraw-Hill, New York.

Miller, D. & Shamsie, J. (1996) The resource-based view of the firm in two environments: The Hollywood film studios from 1936-1965,

Academy of Management Journal, 39(3), pp. 519-543.

Miller, D. & Shamsie, J. (1999) Strategic responses to three kinds of uncertainty: Product line simplicity at the Hollywood film studios, *Journal of Management*, 25(1), pp. 97-116.

Pfeffer, J. & Salancik, G.R. (1978) *The external control of organizations*, Harper & Row, New York.

Porter, M.E. (1980) *Competitive strategy*, Free Press, New York.

Ramanujam, V. & Varadarajan, P. (1989) Research on corporate diversification: A synthesis, *Strategic Management Journal*, 10(6), pp. 523-551.

Stigler, G. (1951) The division of labour is limited by the extent of the market, *Journal of Political Economy,* 59 (June), pp. 185-193.

Stuckey, J. (1983) *Vertical integration and joint ventures in the aluminium industry*, Harvard University Press, Cambridge.

Stuckey, J. & White, D. (1993) When and when not to vertically integrate*, Sloan Management Review*, 34(3), pp. 71-83.

Sutcliffe, K.M. & Zaheer, A. (1998) Uncertainty in the transaction environment: An empirical test, *Strategic Management Journal,* 19(1), pp. 1-23.

Thomas, H. & Venkataraman, N. (1988) Research on strategic groups: Progress and prognosis, *Journal of Management*, 25(6), pp. 537-555.

Tucker, I. & Wilder, R.P. (1977) Trends in vertical integration in the U.S. manufacturing sector, *Journal of Industrial Economics*, 26(1), pp. 81-94.

Wernerfelt, B. (1984) A resource-based view of the firm, *Strategic Management Journal*, 5(2), pp. 171-180.

Williamson, O.E. (1971) On the vertical integration of production: Market failure considerations, *American Economic Review*, LXI(2), pp. 112-123.

Williamson, O.E. (1975) *Markets and hierarchies: Analysis and antitrust implications*, Free Press, New York.

Williamson, O.E. (1985) *The economic institutions of capitalism – Firms, markets relation contracting*, Free Press, New York.

Williamson, O.E. (1991) Comparative economic organization: The analysis of discrete structural alternatives, *Administrative Science Quarterly*, 36(2), pp. 266-296.