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L C Hendry

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**Product Customisation:
An Empirical Study of Competitive Advantage and
Repeat Business**

Professor Linda C. Hendry

Professor of Operations Management,
Department of Management Science,
Lancaster University Management School,
Lancaster,
LA1 4YX, UK.
Email: l.hendry@lancaster.ac.uk

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Product Customisation: An Empirical Study of Competitive Advantage and Repeat Business

Abstract: Empirical evidence is presented from 24 UK based manufacturing companies, all offering a degree of product customisation, with most having a significant pure customisation Engineer-to-order (ETO) element. The evidence addresses the issue of competitive advantage, which has lacked empirical evidence in previous manufacturing strategy literature, and includes a detailed investigation of the strategic importance of repeat business. It contrasts its results with those previously found in the literature and concludes that there are significant differences in the competitive priorities theoretically associated with this sector. In particular, it is argued that cumulative capabilities are needed, with a low cost competence often included. Four different types of repeat business are identified, one relating to *Repeat Business Customisers* and three relating to *Versatile Manufacturing Companies*, and the strategic importance of repeat business is discussed. It is indicated that for some ETO companies, repeat business is perceived to be an important method to reduce costs and achieve business stability. However, a number of the other companies studied saw repeat business as infeasible and hence need to find other ways to reduce costs and improve company performance measures. Future research to extend this work into a longitudinal study or a broader survey is proposed.

Keywords: Manufacturing strategy; Empirical research; Engineer-to-order / Make-to-order; order winners / qualifiers; competitive priorities; cumulative capabilities; Repeat business customisation.

1. Introduction

It has long been recognised that customisation is an important aspect of strategic decision making and that degrees of customisation can vary according to products, processes and transactions (Lampel and Mintzberg, 1996). One type of customisation has received much attention in recent years, that of mass customisation along with the associated Build-to-Order Supply Chain, (see for example, Brown and Bessant, 2003 and Gunasekaran and Ngai, 2005 respectively). This increased level of customisation in supply chains that previously produced standard products has emerged due to the increasing desire for customers to receive a degree of individualism in either the products received or the manner in which they are delivered to them. However, mass customisation is by definition a middle ground in which there needs to be some standardisation of process for this strategic position to be feasible. Thus this strategy is on a different position on the customisation continuum to those companies that have a strong Make-to-Order (MTO) or Engineer-to-Order (ETO) element, and which offer pure or tailored customisation as described in Amaro *et al.* (1999). Such companies are usually organised as a jobbing process, thus allowing flexibility of process as well as product and transaction. The difference can be akin to the bespoke tailor, which makes any item in any material and any size, versus the mass customisation jeans manufacturer, which can make any size, but only jeans in a set range of colours and materials. This paper addresses the MTO/ETO sector, which has received relatively little attention in the manufacturing strategy literature. Yet it is an important sector consisting of many SME subcontractors within the supply chains of industries such as aerospace, as well as larger capital goods manufacturers of items such as industrial machinery. With the emergence and strengthening of the mass customisation sector, and the increase in globalisation, the competitive environment for the MTO/ETO sector is evolving and it is hence timely to study how issues of competitive advantage are developing in this sector.

The topic of competitive advantage has been addressed from a variety of angles by researchers, including the resource based view (sometimes also referred to as the routine-based view) and the market based view, whilst others have focussed on the need to develop dynamic capabilities. An excellent review of these approaches has been presented by De

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7 Toni and Tonchia (2003). Whichever viewpoint is adopted, it is clear that companies
8 should aim to determine a means to achieve a sustainable competitive advantage by
9 developing competences that are hard to imitate. Such competences must hence be unique
10 and are developed through consideration of a number of factors including competitor
11 characteristics, the desires of the customer and the internal resources available. Although
12 there are a number of papers that address these issues, discussed in further detail in the
13 literature review below, very few discuss the issue of competitive advantage in the specific
14 context of the ETO/MTO sector. In addition, authors such as Ward and Duray (2000)
15 suggest that there is a need for further empirical evidence to support the development of
16 the manufacturing strategy theory debated in the literature. This paper seeks to fill this gap
17 by considering competitive advantage in the ETO/MTO sector using in-depth case study
18 evidence from 24 companies in this sector. In particular, it considers how such companies
19 win orders, which is an important and significant area of research in the current
20 increasingly competitive climate of globalisation. Thus there is a further contribution
21 towards the trade-off debate, as discussed by authors such as Boyer and Lewis (2002),
22 along with evidence regarding order winners and order qualifiers as defined by Hill (2000).
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35 In addition to the discussion of factors that affect competitive advantage, a second
36 major theme of the paper is the topic of repeat business within the MTO/ETO sector.
37 Little has been written about this issue in the literature, indeed it is not an issue that is
38 usually associated with ETO companies. However, it was suggested by Amaro *et al*
39 (1999) that one way in which such ETO and MTO companies seek to gain a competitive
40 advantage is by trying to attract repeat business from the same customers, thereby reducing
41 costs. As most of the companies were SME's, with limited management resources, such
42 companies are trying to supply standard products and customised products with the same
43 infrastructure and management procedures. This is contrary to ideas that have been
44 advocated by operations strategists such as Skinner (1974, as discussed in Hayes (2002))
45 and his 'manufacturing sins'. The empirical research presented by Amaro *et al* (1999)
46 draws preliminary conclusions suggesting that a wider and deeper empirical study is
47 needed to further investigate the strategic importance of repeat business in companies
48 offering pure customisation. Thus the empirical evidence presented here also contributes
49 to this debate.
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This paper is organised as follows. After the literature review of some of the key manufacturing strategy references in this area in section 2, section 3 then describes and justifies the research methodology employed in this empirical study. This is followed by a description of the case study company data in section 4 and a discussion of the case study evidence in section 5. Finally, in section 6, the conclusions fully describe how this paper contributes to various debates in the literature regarding the theory and practice of Operations Management, whilst also suggesting avenues of further research.

2. Literature Review

An excellent, extensive, review of the manufacturing strategy literature has been presented by Dangayach and Deshmukh (2001). They categorise the literature in this area into two basic types – process and content. The latter is then broken down further into research which addresses: manufacturing capabilities; strategic choices; best practices; trans-national comparison; performance measurement and literature survey. The research presented in this paper falls into both the manufacturing capabilities and the strategic choices categories, as it seeks to determine the types of strategic choice that are successfully undertaken and the manufacturing capabilities developed in modern ETO/MTO manufacturing companies. Thus this review concentrates on research in these categories. In terms of manufacturing capabilities, Gagnon (1999) presented a literature review on the ‘resource based view’ (RBV) of competition, stressing the importance of ensuring that operations capabilities are used to drive the strategic planning of companies, rather than allowing a market-based lead which assumes a completely adjustable manufacturing function. The latter assumption is clearly unrealistic, indicating that a purely ‘market based view’ (MBV) would be inappropriate. However, it must also be acknowledged that the opposite is equally true in that the market cannot be moulded to ensure acceptability of any products produced. The MBV has its origins in the work of Porter (1980,1985) and hence Porter (1991), along with other authors such as Amit and Schoemaker (1993), has pointed out that the two views are not necessarily conflicting, but that an appropriate assessment of competitors, customers and resources should all play a role in the determination of strategy.

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An important issue that arises from this literature debate is the topic of competitive priorities, also referred to as “competitive capabilities” or “competences” (see for example: Corbett & Van Wassenhove (1993), Boyer & Lewis (2002) and Frohlich & Dixon (2001)). Christiansen *et al.* (2003) conclude that there is broad agreement on the important competitive priorities, listing cost, quality, delivery, flexibility and service, acknowledging that the latter has been added more recently by authors such as Miller & Roth (1994).

Although there is broad agreement on these five competitive priorities, authors such as Ward and Duray (2000) argue that there has not been sufficient empirical testing of this set of factors. In addition, research continues in terms of the definition of the factors. In particular, a continuing research theme is to explore the definition of ‘flexibility’. Examples include the work by Narasimhan *et al.* (2004) and Koste *et al.* (2004). This is important research, which leads to a deeper understanding of the nature and meaning of the competitive priorities in practice. However, by concentrating on a specific priority, this research does not contribute to the debate on the relative importance of the different competitive priorities in the context of specific manufacturing sectors.

Research that links competitive priorities to manufacturing types is very limited, but a key exception is Hill’s (1993, 2000) theory on Order Winners (OW) and Order Qualifiers (OQ), which considers the jobbing and project process choices often found in the ETO/MTO sector. Hill (2000) describes the OW for the project process choice to consist of delivery speed and unique design capability. Repeat business is added to this set for the jobbing process choice. The OQ for both the project and jobbing contexts are suggested to be price; on-time delivery and quality conformance. Yet no empirical evidence is presented to support this theory. Indeed, some authors such as Spring and Boaden (1997) have been skeptical about the notion of OW/OQ, arguing that industrialists do not see a distinction between the two. They also suggest that the OW/OQ concept makes use of the trade-off model that was first introduced by Skinner (1969), but which is now a concept that is questioned by many other authors. For example, Kathuria (2000) presents empirical evidence that contradicts the traditional trade-off model. In contrast, Boyer and Lewis (2002) present empirical evidence that suggests that trade-offs remain. Thus this is an issue that is still under discussion and more empirical evidence is needed to further the trade-off debate in general, along with the notion of OW/OQ’s in particular.

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A particularly important contribution to the trade-off debate was given by Schmenner and Swink (1998), presenting a series of propositions that seek to resolve the conflict. They suggest that trade-offs exist when comparing plants at any given point in time, but that cumulative capabilities (as discussed by authors such as Flynn and Flynn (2004)) occur within one firm over a period of time thereby leading to gradual improvement in all competitive priorities. This paper further explores the trade-off concept within the context of the OW/OQ concept; seeks to find evidence for some of the ideas presented by Schmenner and Swink (1998) and asks whether the latter leads to meaningful managerial implications in the ETO/MTO setting.

Given the argument for further empirical evidence made above, it is necessary to discuss here the key examples of the limited relevant empirical evidence available in the literature. An insightful empirical study that addresses the issue of customisation and strategic choice, by Spring and Dalrymple (2000), presents four case studies along with a thorough literature review including topics such as agility and flexibility. This develops an in-depth understanding of the nature of customisation, arguing that “specials” can be a drain on company resources rather than an important strategic weapon if management do not consider the business rationale for making customised products. The conclusions thereby have strong managerial implications, though specific competitive priorities in the ETO/MTO context are not discussed. Ward and Duray (2000) use survey work to investigate the link between competitive strategy and manufacturing strategy. They conclude that the “differentiator” strategy is most closely linked to the competitive priority of quality; the second strongest link is with flexibility whilst low cost and delivery are also important. The “differentiator” is a broad competitive strategy covering all those companies who do not focus on the cost strategy. Thus it is broader than the MTO/ETO typology discussed here. However it is interesting to note that quality is higher on the list than that suggested by the OW/OQ theory of Hill (2000), whilst flexibility as linked to the unique design capability is seen to be of lower strategic importance. A key study that addresses the issue of OW/OQ in the context of the ETO/MTO sector is that reported by Amaro *et al* (1999) on mainly engineering companies in Denmark, the Netherlands and the UK. This study suggested that the theory developed by Hill (1993,2000) for the project/jobbing processes cannot be entirely supported by empirical evidence, indicating

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7 for example that for many jobbing companies the ability to customise (i.e. the unique
8 design capability) is in fact an order qualifier, and that price is increasingly becoming an
9 order winner. Furthermore the research also indicated that as price and hence costs are
10 becoming more important to jobbing companies, they are searching for ways to reduce
11 their operating expenses. This is particularly difficult in this sector as these firms are not
12 always able to adopt the processing efficiencies of the mass production or even the mass
13 customisation companies. Thus the issue of repeat business arose in many companies.
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19 This study follows on quite closely from the research presented by Amaro *et al*
20 (1999), as this is the only empirical paper identified that specifically looks at issues of
21 competitive advantage and repeat business in the ETO/MTO sector. As pointed out by
22 Dangayach and Deshmukh (2001), most of the manufacturing strategy literature is cross
23 sectional rather than addressing particular types of products or industrial markets.
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29 *2.1. Taxonomies of non Make-to-Stock companies*

30 Before proceeding further, it is also necessary to clarify the definition of the ETO/MTO
31 sector, as used in this paper. It is noted that this topic has been addressed by many authors
32 including Hill (1993, 2000); Olhager (2003) and Hallgreen & Olhager (2006). Building on
33 the previous taxonomies, Amaro *et al* (1999) presented a new empirically tested taxonomy
34 for non Make-to-stock companies with 17 different categories. In this paper, an abridged
35 version of that taxonomy is used to classify the types of companies that are studied, as this
36 is sufficient to pick out the key characteristics of the companies that are relevant to
37 competitive advantage and the nature of repeat business. Two key aspects of the original
38 taxonomy used here are:
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- 47 • The titles ETO, MTO and ATO (Assemble-to-order), where these titles indicate
48 the amount of work carried out after the order has been placed. For ETO, the
49 design, manufacture and assembly of the product takes place after the order is
50 confirmed. For MTO, the basic design is already in place, and though there may
51 be some modifications to the design, most of the work after the order is confirmed
52 is in the manufacture and assembly of the product. Note that in this case, the
53 design can be supplied by the customer or by the MTO company. In the ATO
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sector, it is just the assembly of the components that is carried out after receipt of a definite order; the components are produced to stock in advance.

- The nature of the customisation carried out by the company. The first three categories are as defined by Mintzberg (1988) and refined by Lampel and Mintzberg (1996). Firstly, there is pure (p) customisation, which entails producing a new design. Secondly there is tailored (ta) customisation, which entails the modification of an existing design. Thirdly, there is customised standardisation (cstan), where the customer can pick from a set of design options. In addition, a fourth category is used, which is described as 'none'. It is needed for those MTO and ATO companies that choose to await a customer order, even though they produce a standard product with no customisation options. This is in contrast to customisation companies that cannot complete ahead of the customer order as no two orders are alike.

Thus the following categories are used:

ETO (p),

MTO (ta), MTO (cstan), MTO (none),

ATO (cstan), ATO (none)

In addition, it has been postulated that a firm can be a 'Repeat Business Customiser' (RBC), negotiating business as a series of orders by contract, or a 'Versatile Manufacturing Company' (VMC), negotiating each order separately. These definitions are discussed in detail in Amaro *et al* (1999), and explored further as part of the evidence on repeat business issues in this paper.

3. Methodology

The main research questions used in this study are as follows:

- What are the competitive priorities in the MTO/ETO sector and why do they lead to competitive advantage? In particular, when and why is pure customisation just a qualifier for companies offering purely customised products? Or, instead, when and why does it become an order-winner?

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- Do companies offering customised products select "repeat business" as a strategic choice, as a means to reduce their business cycles and therefore increase their efficiency and profitability? If so, why? If not, why not?

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The data was collected from the 24 companies, all based in the North West of England, via semi-structured interviews. Thus the unit of analysis is the plant, which is argued to be an important unit of analysis by authors such as Brown and Bessant (2003). The case study methodology was chosen as issues of competitive advantage are complex and it was felt that a postal survey would not be well answered. In addition, this methodology allowed a broad set of competitive priorities to be studied rather than limiting the findings to a predetermined set of factors. Thus the study allowed all of the issues currently identified in the literature to be explored, whilst also allowing interviewees to add other factors to the debate. In addition, the larger postal survey is generally better for discovering 'what' is happening rather than 'why'. In this study, the research questions begin with 'what are the competitive priorities', but the further exploration of 'why' these issues lead to competitive advantage is important so that the relevance to other companies can be determined clearly. Thus rich, qualitative, data was collected and analysed from which it would be possible to derive greater managerial implications. For further justification of the case study approach, the reader is referred to Yin (2003) and Voss *et al.* (2002). For other examples of empirical research using the case study approach, see Williams (2006) and Stevenson & Silva (2007).

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In choosing the 24 case studies, the literal replication logic, as advocated by Yin (2003), was employed. Thus the study sought to identify companies with a significant level of ETO/MTO business, for whom it was expected that similar competitive priorities and similar attitudes to repeat business might exist.

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The data was collected using semi-structured interviews employing an interview protocol and allowing plenty of opportunity for interviewees to add other relevant information (the interview protocol is available from the author on request). The right hand column in Table 1 indicates the job role of the interviewee(s). In one company, two managers were interviewed. In all other cases bias introduced by the perspective given was carefully considered in analysing the data. Summaries of each interview were typed up

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7 and sent to the interviewee with any outstanding questions marked. This was followed up
8 by a telephone query to clear up any such outstanding issues. Good feedback of this type,
9 as recommended by Voss *et al.* (2002), was received from most of the companies involved.

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11 A pilot study was carried out in one company. As this did not lead to any issues
12 that could not be resolved through a follow up telephone call, the data for this company is
13 as complete as for the other companies. Therefore, it is included in the set of 24
14 companies discussed below. Thus the number of companies studied is sufficient to enable
15 patterns to be considered in the data, such as allowing the level of customisation offered by
16 competitors to act as an explanatory factor, though not sufficient to lead to any statistical
17 tests. The patterns identified provide in-depth rich insights into the research questions
18 posed.
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21 In conducting case study research, it is important to carry out a rigorous approach
22 to the analysis, to ensure that the chain of evidence is clearly documented and that high
23 standards of validity and reliability are attained, see Eisenhardt (1989), Yin (2003) and
24 Voss *et al.* (2002) for a detailed discussion of these issues. In this study, searching for
25 cross-case patterns was of particular significance along with the enfolding of literature to
26 discuss how the findings confirm or contradict previous studies.
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29 30 31 32 33 34 35 36 37 38 **4. The Case Study Data** 39

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41 The characteristics of the 24 companies studied are presented in Tables 1, 2 and 3 below.
42 Table 1 describes the companies in terms of the main business area and number of
43 employees. It is noted that the majority of companies could be described as SME's, with
44 17 out of the 24 having a workforce of less than 150 employees. The main business area
45 can be a manufacturing capability such as precision sheet metal components (e.g.
46 companies B and C), or more commonly a type of product such as doors, windows or a
47 type of industrial machinery. In all the latter cases, there is a degree of customisation
48 involved in the manufacture; none of the companies studied produced entirely standard
49 products. Although the study focuses on the ETO/MTO sectors, 4 companies with a main
50 ATO focus were retained as they provided useful insights relevant to the discussion.
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59 [Take in Table 1]
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Table 2 categorises the companies using the abridged taxonomy described in the previous main section of this paper. In the second column, the main business type is given; this refers to the type of business which is most common. In the third column, any other business type is also listed. This shows that 15 out of the 24 companies have some degree of ETO (p) activity and it is the main business line for 7 of those 15 companies. Note that many of these companies operate in several markets, either with the same product that can be customised or standard, or by supplying several types of product. The fourth column seeks to identify the % of ETO activity within the business. It is noted that this is not a static figure and many companies found it difficult to answer this question. However, the information provides an indication, which is sufficient for comparative purposes. Finally, the fifth column indicates whether the company operates as an RBC or a VMC firm.

[Take in Table 2]

Table 3 indicates which companies compete only against competitors which offer the same level of customisation; those companies which compete only against competitors offering less customisation and those which have a range of competitors, some offering less customisation and some offering the same. Note that none of the companies studied had competitors offering more customisation. The identification of this factor was an important aspect of the data analysis, which led to the discussion in the following section.

[Take in Table 3]

5. Discussion of the Case Study Evidence

The qualitative data is discussed in three sections:

- competitive advantage, with particular reference to OW/OQ and competitive priorities;
- repeat business and
- additional insights.

5.1 Competitive Advantage

Many of those interviewed began by declaring an overwhelming sense that everything is important, including price, design ability, delivery speed, delivery reliability, quality,

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6 flexibility and customisation. Hence, this would lead to the conclusion that no competitive
7 priority can be neglected and modern manufacturing firms cannot afford to adopt the trade-
8 off stance. However, when questioned more deeply, patterns emerged, relating to the type
9 of competition and the degree of customisation that the firm offered.

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13 Firstly, it is noted that of the seven companies, A-G, for whom ETO (p) is the main
14 line of business, 5 had competitors offering the same degree of customisation, whilst the
15 other 2 had competitors with the same or lesser degrees of customisation. For these
16 companies, customisation does not figure as a key order winner, in fact in some cases, such
17 as company E, customisation is not even considered as an OQ. Hence, all of these
18 companies support the theory that where competitors offer similar levels of customisation,
19 other OW factors must be found. Companies A, D, F and G state that price is a key order
20 winner. For example, the Operations Manager in company G stated that: “at the end of the
21 day, price is the most important thing when contracts are fought for”, thus the company
22 “will invariably win orders on a price basis”. Company A noted that though price is a key
23 OW, this is only the case for the less sophisticated customer; for more sophisticated clients,
24 price is less important and such clients may then try to squeeze the company on price
25 through negotiation. Similarly, company F felt that price and customer relationships were
26 key factors in winning business. If a long-lasting and trust based relationship exists, then
27 “if the company happens to offer a higher price, it might be offered the option to adjust its
28 price to the competition and so win the job”. It was also noted that the buyer is not only
29 interested in the cost of the initial purchase. If the company can offer a unique technical
30 solution that can reduce the long term running cost of the equipment, then this may also be
31 the OW. This suggests that design ability is then important, but in a manner that is linked
32 to the long term cost of the solution for the customer.

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Companies B and C both claimed that their key OW was the ability to offer the
whole package to the client: to take “an original customer’s requirement and to turn it into
a final finished product”. In fact company C claimed that the OW had already evolved
beyond price and that as companies were now competitive on this factor, yet other newer
competitive advantages had to be found.

Company E saw price as being an important OW, but only as part of an overall
package, in which the company scored highly on price, quality and service. It was felt that

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its advantage was “being good at all these things” consistently. However, it was also stated that technical ability was an important competitive advantage and the company was not clear about which factor was most important.

Overall, this evidence suggests that the world of the pure customiser is very competitive and that customisation alone is not sufficient to win business. Instead, other factors are now becoming important, and price is often one of the key issues. This conclusion is summarised in the first row of Table 4 and in Table 5, which also summarises the remainder of the discussion in this section below.

[Take in Table 4]

[Take in Table 5]

For most of the remaining companies for which the competitors offered the same level of customisation, the type of customisation on offer is either MTO (cstan) or ATO (cstan). These companies are O, Q, S, T, W, and X. For these companies, it is more difficult to identify a pattern in the OWs and OQs that were claimed by those interviewed. However, again none of them suggested that customisation was an OW. Instead, companies O and X included price. The former also suggested that delivery speed and reliability are important for their MTO (cstan) business, but less so for the MTO (ta) and ETO (p) sector. Company X is smaller than its competitors and is therefore able to compete on price for low volume orders that the larger competitors do not want. However, the competitors could undercut them on price if they did want this business in the future. The company also has two other key advantages: it currently offers larger concrete mixers than the other manufacturers and smaller customers prefer to work with smaller companies as they feel that they will receive a higher quality service. Other competitive priorities for companies Q and T are given in Table 5. For company W, the design was seen to be a key factor as it has the highest speed machinery and the greatest range of pattern attachments. However, they acknowledged that smaller companies sometimes try to enter the market and undercut on price, but they rarely succeed as they do not have the efficiency of the larger organisation. This company appeared to have a degree of business confidence based on operating in a small market, with few clients and few competitors, in which it has a good reputation.

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Interestingly, company S supported the claim of company B, that the OW and OQ are changing over time, or at least becoming more stringent. All its competitors are good on price and quality now, so it needs to find a new way to compete. Hence important factors include flexibility in terms of capacity adjustment or good personal relationships with clients.

For the MTO (ta) companies, two had a competitor offering the same degree of customisation, companies I and J. Of the remaining companies in this sector, K and L had competitors offering the same or lesser degrees of customisation, whilst companies H and M had competitors offering less customisation. Here a difference in the way they compete can be clearly attributed to the nature of their competitors. Company L claimed that there is a need to offer something which your competitors do not offer. So customisation is offered where their competitors do not offer this, or technical superiority is offered where they are competing against a similar level of customisation. For company M, customisation is the clear OW for the MTO (ta) part of their business. Company H also sees their expertise as the main way to win orders. They offer a consultancy service which advises the client on the best type of door, and so it is their design capability which is particularly pertinent. They aim to offer competitive though not necessarily the cheapest prices, thus suggesting that price remains an OQ. These conclusions contrast with Companies I and J, for which customisation is not an OW. For I price is more important as an OW than an OQ, but it never loses business on the basis of price, as it is always willing to adjust prices (though never at a loss).

For company K, competitive advantage still depends on the nature of the competitors, but it is now the size of the competitor as well as the degree of customisation that is important. If competing with a company of similar size, then it can be that price is a key OW. However, if the competitor is larger, then it is necessary to find an alternative competitive edge such as by offering more customisation or flexibility. Thus they perceive that they can charge a premium for true 'specials', as this is something that their competitors do not offer. As discussed above for company A, company K also felt that the sophistication of the client is important, with less sophisticated clients being more interested in price.

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The remaining companies with competitors offering the same or lesser degrees of customisation are companies P and U, offering mostly MTO (cstan) and ATO (cstan) respectively. Company P acknowledged that it is difficult to keep a steady flow of work; hence there is a tendency to cut prices when they really want an order. In general, however, price is important for their MTO (cstan) market, but less so for their more customised business. Here it is the technological solutions that matter more, and it is here that the competitors offer lower levels of customisation. For company U, price is not seen to be an OW, instead quality and design capabilities are key. This is a small company, winning more small projects than large ones as it does not have the economy of scale necessary to win large orders. So again company size is important.

Of course, some companies also felt that the winning of orders was not necessarily based on good decision criteria. For example, companies G and I both pointed out that sometimes “national prejudice” is a factor that affects decision makers in the client organisation, with some buyers for company G biased towards German products, whilst others are biased towards British products.

5.2 Repeat Business

As discussed in the earlier literature review section, the term ‘Repeat Business Customiser’ (RBC) was introduced by Amaro *et al* (1999) to refer to companies which negotiate business as a series of orders by contract. This was introduced alongside the term Versatile Manufacturing Company (VMC), which referred to those companies that negotiate each order separately. Thus in the RBC case the nature of the repeat business was to attain a series of orders for the same customer for the same product. However, during the analysis of the empirical data for this study, it became apparent that repeat business was also an important strategic objective in several of the companies categorised as VMC’s. In this case, the nature of the repeat business could be one or more of the following three types:

- the repeat sale of a product initially designed for one customer, but then also sold to one or more other customers. If this type of repeat occurs on several occasions, then the company could be in the business of evolving its product lines from highly customised products to much more standard products.

- repeat business for the same customer, but for a different product. Thus the company is benefiting from long term relationships with customers, which can lead to future orders, albeit with a fresh need to design and manufacture the product.
- repeat business for the same product for the same customer. This may seem similar to the RBC case, but here the number of similar orders is very small, and each product is generally ordered separately.

Figure 1 summarises these categories of repeat business, giving the labels R, V1, V2 and V3 Type, for ease of reference throughout this section. Table 5 then indicates the type of repeat business in which each company is involved. Note that not all VMC's are included in Table 6, as it was noted that some of these companies indicated that they do not experience any repeat business at all at present. In addition, the discussion focuses on repeat business of customised products, particularly ETO(p). Thus, if the repeat business only relates to products categorised as MTO or ATO, then these companies are excluded from the discussion below.

[Take in Figure 1]

[Take in Table 6]

Table 7 summarises the percentage of repeat business for the ETO(p) type of customisation, also indicating preference towards increasing this percentage and the impact that repeat business is perceived to have upon manufacturing profitability. As indicated earlier in Table 2, companies B, C, D and E are all RBC companies, the first three having 100% ETO(p) activity, whilst E has 90%. In each case, they are in the business of producing components for a larger manufacturer, with large contracts negotiated as a series of orders over a long period. Hence they all exhibit clear 'R' type repeat business. The case study evidence for companies B, C, D and E suggests that the repeat business nature of their work is of strategic importance. For company B, this is particularly pertinent as it is only for repeat orders that they typically make a profit. For new orders, it was stated that they only break even with a 0% profit margin as it was suggested that the aim at this stage is to win a longer-term contract. Despite the lack of profitability, the company stresses the need for new orders for new products, stating that ideally the company wants to attract at least one new customer per year, with at least one new product per month. The Managing

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Director referred to the “natural wastage of customers”, claiming that “any company needs to get new businesses (new customers/ new products) each year otherwise it will die”.

[Take in Table 7]

In contrast to company B, the Managing Director of company C stressed the need for repeat business rather than the need for new business. He stated that when the objective is to grow the operations, there must be a balance between new business and repeat business. In addition, he stressed that the bigger the company gets, the more it needs consistency, which only comes from repeat business. The strategic objective here is to increase the percentage of repeat business from 50% to 70%, retaining 30% of new orders as needed to develop new long term contracts, not to produce one-off batches unless this was seen as a special requirement for an existing customer. The reason for stressing the importance of repeat business in this case was due to the efficiency gains achieved. In this case, the customers provide a forecast of their requirements for the next 2/3 months. Even though this is subject to change, these forecasts enable the company to make batches of products and to carry some stocks of raw materials or products (either at the final or part processed stage). Thus they are able to supply their customers on a Just-In-Time basis, assisting customers in minimising their inventories.

Similarly company D stated the advantage of repeat business from a company efficiency point of view. For example, long-term contracts with one client can lead to the purchase of specialised tooling. This can be problematic when making the initial investment for a small company, but has long-term benefits. As for company B, a significant proportion of new business is felt to be of strategic importance especially for expansion prospects. This explains the stated aim to decrease the percentage of repeat business to a slightly lower value than the stated 80%. Thus all three of companies B, C and D require a balance of new and repeat business, the former providing long term stability whilst the latter provides company efficiency gains and prospects for growth. Although the preferred percentage of each type of business varies, all of them state a desire for a majority of repeat business, ranging from 70 – 90%.

For company E, the costs of tooling are such that it cannot make anything as a one-off, as it is too expensive to invest in the tooling. Therefore all of its ETO (p) business is for large volumes on an RBC basis for a twelve month period or more. Set-up times can

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be particularly costly here and hence the levels of repeat business are perceived to be essential to enable the company to make products in batches and stock items to meet orders. Thus this company provides an extreme example of an 'R' type RBC company, for which only repeat business is perceived to be viable.

From Table 7, it can be seen that there is not a clear pattern amongst companies B to E in terms of profitability differences between repeat orders and new orders. Thus there are a variety of reasons for the strategic importance of repeat business for these companies, which do not always include cost reduction.

For companies F, J, N, O, P and U, with relatively low levels of repeat ETO(p) business, a desire was expressed to see an increase in this aspect of their work, either by attracting more business from the same customer (V2 Type) or by converting some one-off special products into products that can be sold in a tailored customisation or standardised customisation manner to future clients (V1 Type). For example, company F, with the use of CAD design, is able to produce modified designs very quickly, thus reducing costs. The reduction in costs can either be converted into increased profits or into a lower price for the customer to improve the chance of winning the order. Usually a compromise is reached, leading to slightly more profitable repeat orders. Similarly, company J saw advantages in reduced costs through repeat business. However, for company J, when selling the same machine more than once there is often such a large time gap between the two orders that it is necessary to upgrade the machine design. Hence it may be regarded as a new product rather than a repeat from a design and cost point of view. For company O, the reasons for wanting more repeats were due to increased profits and lower levels of engineering works. However, in this case the company Managing Director felt that it was unlikely to be feasible to increase the percentage of repeats above the 15% quoted. Thus for all three of these companies, producing capital goods, the strategic importance of repeat business is due to the increased ability to control lead times and the improved profitability.

In contrast, the Managing Director of company N claimed that it is difficult to estimate the difference in profit between new and repeat orders, but that profits are possibly slightly higher for the new orders. Despite this, a desire was expressed to develop a standard range of products from customer specific orders, increasing the level of repeats to a much higher percentage than the 10% quoted. The reasons given are however still

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7 cost related, as design and engineering employees are seen as overhead costs. The
8 engineering design of a new product is clearly much higher than for a repeat order, and
9 hence higher levels of repeats will lead to a bigger turnover to absorb the same overheads,
10 hence reducing the cost burden in relative terms. However, the desire to increase the level
11 of repeats is seen as problematic in practical terms due to the difficulty associated with
12 combining the volume and the specials business. Thus consideration is being given to the
13 development of a separate workshop for the repeat volume part of the business. At
14 present, customised production gets priority because these contracts are perceived to be of
15 higher importance to the company.

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22 Similarly the sales manager of company P stated that repeat orders do not
23 necessarily lead to a higher profit. Instead, the main advantage is that for a repeat order
24 “the risk is taken out of the job”. For new jobs, the estimation process has a high risk as
25 the company is not as sure about the costs as the machine may prove to be more difficult to
26 build than expected. Hence the company is more able to control costs with repeat orders,
27 leading to greater control of other aspects of the management process including lead times.

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33 For companies A and G, the nature of the capital goods they supply is such that
34 repeat business is very unlikely as the equipment lasts for many years and hence a
35 customer would only purchase another if they expand their operation. However, for
36 company A, there are occasions when a client modifies its plant or wants to install some
37 new machinery. Thus the company values repeat business from the same customer, but for
38 different products (V3 Type). The Managing Director stressed: “you still have to sell to
39 them, to keep in touch with them”. It is no good just expecting them to come back for the
40 next order, clients are visited regularly to ensure that company A is considered for future
41 orders. However, this type of repeat business does not lead to any cost savings. Thus, for
42 both company A and company G, other means to drive down costs must be found. Similar
43 issues arise for company I, for the ETO(p) part of the business, giving further evidence of
44 the possibility and perceived importance of ‘V3’ Type repeat business. However, much
45 of the business for company I is for MTO production with standard components and hence
46 costs are reduced in the usual way for manufacturing a standard product.

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53 For the remaining VMC companies with an element of ETO(p), the issue of repeat
54 business has a much lower strategic priority. For example, for company H, there are very
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7 few repeats and the company has no intention of changing this. The perception of the
8 Marketing & Sales Director is that the company “sells its expertise, which is the one
9 unique thing the company has and that no other door manufacturer has”. It was
10 acknowledged that to grow might mean to generate volumes by moving into the standard
11 door market. However, this was seen as a separate venture, which could lead to the setting
12 up of a second company. There was a strong perception that mixing the production of
13 standard and special doors was not a good idea and that it is better to commit resources to
14 the production of special doors for major projects. Similarly, the Sales Manager of
15 company K stressed that the company’s aim is to take advantage of the niche market
16 offered by making special machines. The number of competitors in this market is very
17 small, and a recent contract was quoted in which there were no competitors for the order.
18 In this case, the price can be high to offset the level of risk involved in determining the
19 method of manufacture etc. In this ETO (p) market, there is little scope for repeat
20 business, but this is a situation, which the company is not trying to change. Although only
21 two companies expressed this less favourable attitude to the strategic importance to repeat
22 business, this evidence demonstrates that some companies still aim to sustain long-term
23 viability depending heavily on one-off or small batch production, despite the risks involved
24 when determining the prices to quote for products that have never been produced before.
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40 *5.3 Other Insights*

41 The case study evidence also provides some very tentative evidence of the movement of
42 companies along the line of the taxonomy presented in the earlier literature review section.
43 For example, company H has experienced growth by developing a separate standard doors
44 business, which is perceived to have a very different strategic position to its specials
45 business. Company R has a policy of making one-offs into standards, relying often on its
46 customers to come up with the ideas for new product designs. Company U has moved in
47 the opposite direction, having initially offered a standard product, they are now involved in
48 customisation. In this case, it was suggested that the onset of mass customisation has
49 killed the market for the more standard product.
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58 In addition, for one of the companies studied, the importance of competitor analysis
59 was seen to be key to their success. In particular, this company, K, indicated that
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personnel went as far as getting real quotes from its competitors and this lead to a better understanding of the competition than was apparent in most of the other companies studied.

Finally, the evidence suggested that several companies operate in more than more market. For example, company M offers both standards and specials and it was suggested that it is strategically important to keep a foot in both markets.

6. Conclusions

In order to draw conclusions, it is necessary to consider the case study evidence in the light of the literature discussed in section 2. Two research questions were posed in this paper, and these are now revisited, drawing conclusions for each one in turn in sections 6.1 and 6.2 below. Finally section 6.3 looks at the managerial implications that can be drawn from the findings in this paper, and identifies areas of future research.

6.1. *Competitive priorities in the MTO/ETO sector*

As posed in section 3, the first research question required the identification of the competitive priorities of the MTO/ETO sector, along with reasons as to why these priorities were believed to lead to competitive advantage. In particular, the question asked when and why pure customisation is an order winner rather than a qualifier. To some extent, this question assumed that the concept of OWs and OQs is a valid concept, although as discussed in the literature review, the paper has also sought to investigate whether the trade-off concept, an underlying principle of the OW/OQ concept, is itself valid.

The first important conclusion in response to this research question is that pure customisation is only a competitive priority and hence an order winner if this is not offered by a firm's competitors, as illustrated in Table 4. Thus this suggests that the theory put forward by Hill (2000) is overly simplistic in its statement that design capability is an OW for companies who adopt the jobbing or project process, as commonly found in the MTO/ETO sectors. Instead it is concluded that price is often an OW for these companies, a factor which is seen as only an OQ in Hill's (200) theory, with design ability then confined to be an OQ. This is the opposite of the generalisation in Hill's (2000) theory. In

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7 fact, it is argued here that no generalisation can be identified for this type of company as
8 the nature of the competition can vary and it is this which affects the competitive priorities
9 rather than the type of company itself.

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11 This conclusion could be thought to provide evidence for the Market Based View
12 (RBV) of the firm. However, a variety of alternative competitive priorities are given in the
13 evidence, which include manufacturing competencies such as delivery speed and reliability
14 and thus there is also evidence of the Resource Based View (RBV). The evidence
15 therefore supports the view that there is no inherent conflict between the MBV and RBV,
16 but that there is a need to consider external and internal factors when determining
17 competitive priorities.
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21 A further important conclusion relates to the trade-off debate. The evidence here
22 supports the argument that there are cumulative capabilities, as discussed by authors such
23 as Flynn and Flynn (2004). Over time, many firms are experiencing changes in the
24 competitive priorities, claiming that as their competitors find ways to imitate one
25 competence, it is then necessary to identify new unique areas of competence and so on.
26 For example, in many cases, the competitive advantage had historically been sought
27 through customisation capabilities, but, as competitors have become increasingly able to
28 offer this too, other factors such as price, reputation and customer relationships have also
29 become important. Some interviewees further argued that the competitive priorities have
30 become more stringent over time, with the need to continually review the most important
31 area of competence to improve. This evidence provides support for the propositions of
32 Schmenner and Swink (1998) that whilst cumulative capabilities must be built up over
33 time, there is scope to concentrate on specific issues at certain points in time. They
34 conclude that there is no conflict between cumulative capabilities and trade-offs, with the
35 former relating to a longer period of time than the latter. This empirical evidence
36 presented in this paper confirms this by suggesting that at any one point in time,
37 competitive priorities depend on the nature of the competitor actions, and a trade-off then
38 exists at that point as is realistic to resource allocation and budget constraints. Over time,
39 as the market evolves, so do the competitive priorities leading to cumulative capabilities in
40 the long run. Thus firms cannot afford to be complacent on issues such as price, even if
41 they have strong design and customisation capabilities.
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In terms of how this relates to the concept of OWs and OQs, it is concluded that these too might exist in the short term, but in the longer term, it is not possible to be complacent on any issue. So for example, pure customisation might be an OW in the short term, with the firm needing to improve this competence, whilst being temporarily satisfied with other issues such as price. However, in the longer term, all issues need to be improved, and thus it is dynamic capabilities that become the key resource to cultivate, as discussed by authors such as De Toni and Tonchia (2003). It is therefore strongly concluded that OW/OQs will change over time, may even vary at one point in time, given the variety of customers served by a firm, and thus that the identification of competitive priorities is far more complex than the concept of OW/OQs suggests. Thus, whilst this concept continues to be useful as a theoretical teaching tool to understand types of manufacturing company, it does not provide a useful concept for practicing managers to aid in the determination of competitive priorities.

6.2. Repeat Business as a Strategic Choice for ETO companies

The second research question, as posed in section 3, asked whether repeat business is a strategic choice for those companies offering pure customisation, aiming to gain an understanding of how and why this might be feasible in this sector. The conclusion to this question is that for many of the ETO SME's studied, some aspect of repeat business is believed to be essential to their survival and is therefore an important strategic choice. Four main types of repeat business have been identified through the case study evidence, as illustrated in Figure 1, showing that this conclusion applies to Repeat Business Customisers (RBCs) and even some Versatile Manufacturing Companies (VMCs). The types of repeat business include sporadic repeat business for a different product to a previous client. This is seen by some VMCs as part of a strategic policy to pursue long term customer relationships in order to ensure as much repeat business as possible, even if this is for a unique product each time.

However, the key reasons for this strategic choice are varied, and do not necessarily include issues of profitability and efficiency as stated in the research question. Whilst one or both of these factors was seen to be a key driver for some of the case study companies, for others more important factors include reduced risk, ease of planning and lower

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7 operating costs. A clear distinction between cost and price was identified in the context of
8 this evidence, with some interviewees suggesting that whilst costs might be lower for
9 repeat orders, this did not necessarily translate into higher profits. As stated in the
10 literature review, the study of Amaro *et al.* (1999) is the only previous study that has
11 considered this issue. This evidence adds more detail to the understanding of this issue,
12 confirming that repeat business is important in this sector, but indicating that the reasons
13 are more complex than those previously identified. It is also noted that there were some
14 exceptions, with two of the ETO companies clearly stating that repeat business was not a
15 strategic choice as it was not perceived to be viable in their particular business
16 environment.
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25 26 *6.3 Managerial Implications and Future Research*

27 From a managerial implications perspective, the research reinforces the need to understand
28 competitors as well as customers. Competitive priorities are as much a result of the
29 competitor actions as of the particular market segment that the company is aiming to
30 attract. It is suggested that this is largely a result of a change in the manufacturing
31 environment, whereby, as more companies gain the ability to customise goods efficiently,
32 the customer is able to choose between a group of ETO/MTO companies when developing
33 long term or short term supplier relationships. The results also confirm that there remain a
34 number of manufacturing companies for which the level of repeat business remains low at
35 15% or less, and these companies need to seek other ways to reduce their operating costs
36 than those that are available to the mass production and mass customisation industry.
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45 Future research could include a larger survey to further confirm these results and
46 the size of each of these sectors of industry with varying degrees of repeat business. An
47 additional topic that could be covered in this survey would be the level of information
48 system used and how this affects the level of customisation that can be offered. This may
49 be important for the software market in establishing a need for software, which provides
50 alternative planning & control systems for the ETO/MTO sector, other than the ERP based
51 systems currently widely available. For example, workload control is designed for
52 companies with a large VMC element and research is ongoing to develop this into a
53 commercially viable alternative (see for example Stevenson *et al.*, 2005). In addition, this
54 study could be extended into a longitudinal study to investigate whether and how OW/OQs
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have evolved since the initial data collection and whether companies have evolved in terms of the degree of customisation they offer or the percentage of repeat business in their portfolio.

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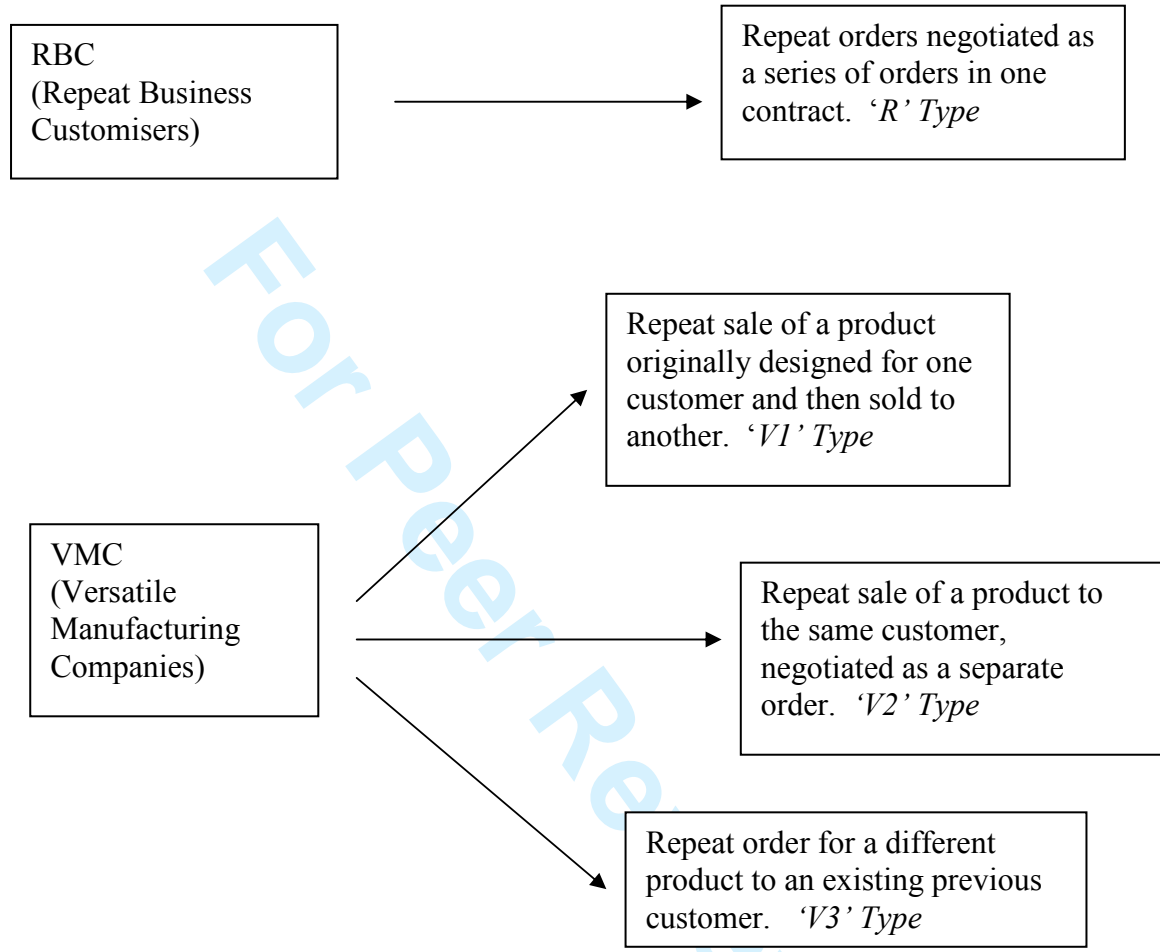


Figure 1: Types of Repeat Business

Company	No. of employees	Main business area	Interviewee(s)*
A	70	Boiler Plants	MD
B	86	Precision sheet metal components.	MD
C	130	Precision sheet metal components.	MD
D	102	Crankshafts e.g. for medium / large diesel engines	MD
E	230	Pressed components	SM
F	100	Bulk conveying / handling systems	MD
G	500	Roof support and chain conveyors for coal mines	SM
H	50	Lift doors and specialist industrial doors	SM
I	175	CNC tube bending machines and machine tools	SM
J	200	Textile machinery	MD
K	67	Industrial machines for processing polyurethane foam	SM
L	257	Switchgears and reclosers.	OM
M	100	Doors: specialised fire resistant, sound proof etc	SM
N	48	Industrial machinery for personal hygiene products	MD
O	147	Industrial machinery: e.g. for wallpaper coverings	MD
P	15	Industrial Dryers etc	SM
Q	64	Metal, steel and aluminium roofs and walls.	OM, SM
R	100	Farm equipment, such as feeding systems, silos etc	OM
S	105	Forks for fork lift trucks	SM
T	84	Calender* bowl with 100 different covering materials	MD
U	56	Windows: specialises in steel frames	MD
V	590	Industrial machinery: e.g. loaders and mini escalators	OM
W	300	Tufting machines for carpet industry	MD
X	28	Site dumpers for using on construction site; concrete mixers	MD

*MD – Managing Director; SM – Sales Manager; OM- Operations Manager

Table 1: Case study company characteristics

*Calender bowls are used in industrial machines used by paper and textile manufacturers.

Company	Main Business Type	Other business types	% ETO activity	Type of customisation of company
A	ETO (p)		100%	VMC
B	ETO (p)		100%	RBC
C	ETO (p)		100%	RBC
D	ETO (p)		100%	RBC
E	ETO (p)	MTO (none)	90%	RBC
F	ETO (p)	MTO (ta)	70%	VMC
G	ETO (p) & MTO (ta)		50%	VMC
H	MTO (ta)	ETO (p)	45%	VMC
I	MTO (ta)	ETO (p), MTO (cstan)	15/20%	VMC
J	MTO (ta)	ETO (p)	15%	VMC
K	MTO (ta)	ETO (p), MTO (cstan)	10%	VMC
L	MTO (ta)		0%	VMC
M	MTO (ta)	MTO (none)	0%	VMC/RBC
N	MTO (cstan)	ETO (p), MTO1 (ta)	25%	VMC
O	MTO (cstan)	ETO (p) MTO (ta)	16%	VMC
P	MTO (cstan)	ETO (p), MTO (ta & none)	> 0%	VMC
Q	MTO (cstan)		0%	VMC
R	MTO (cstan)		0%	VMC
S	MTO (cstan)	MTO (none)	0%	RBC
T	MTO (cstan)	MTO (ta)	0%	VMC/RBC
U	ATO (cstan)	ETO (p), MTO (ta)	5%	VMC
V	ATO (cstan)		0%	VMC
W	ATO (cstan)	MTO (ta)	0%	VMC/RBC
X	ATO (cstan)		0%	VMC

Table 2: Case study companies and the degree of ETO activity

Degree of customisation Of competitors	Companies
Same only	A, C, D, E, G, I, J, O, Q, S, T, W, X
Less only	H, M, N, R, V
Same or Less	B, F, K, L, P, U

Table 3: Case study companies and their degree of customisation compared with their competitors

Main Company Type	Level of customisation of Competitors		
	Same only	Less only	Same or Less
ETO (p)	Price – A, D, E, G Other – C, E		Price – F Other – B, F
MTO (ta)	Price – I Other – J	Customisation – H, M Other – H	Price – K Customisation – K, L Other – L
MTO(cstan)	Price – O Other – O, Q, S, T	Customisation – N, R Other – N, R	Price – P Customisation – P
ATO (cstan)	Price – X Other – W, X	Customisation – V Other – U, V	Price – X Customisation – X Other – W, X

Table 4: Competitive priorities by company type and the nature of the competitors

Other Competitive Priorities Identified	Relevant companies
Customer relationships / reputation	F, J, Q
Whole package solution	B, C
Technical/ design ability	E, H, L, N, P, Q, R, U, V, W
Delivery speed and reliability	O, J
Company size	X, K
Quality & Service	E, J, N, Q, R, T, U, V
Flexibility	K, N, R, S, V

Table 5: Competitive priorities “other” than customisation and price

Type of repeat Business	Relevant Companies
R Type	B, C, D, E
V1 Type	F, J, O, N
V2 Type	F, J, O, N, P, U
V3 Type	A, G, I

Table 6: Case study companies and the type of strategically important ETO(p) Repeat Business

Company	% of Repeat Orders in the turnover	Preference for more Repeat Orders	Differences between New Orders (NO) and Repeat Orders (RO) in terms of profitability
A	0%	More	N/A
B	80-90% (20-25% same product; 60-65% modifications)	Same	NO: at best 0% RO: about 30%
C	50%	More	Same
D	80%	Less	Same
E	100%	Same	N/A
F	Small %	More	RO is 3-5% more profitable than NO
G	0%	More	N/A
H	Small %	Same	Same
I	0%	More	N/A
J	Small, varied %	More	RO is more profitable
K	0%	Same	N/A
N	10%	More	Difficult to measure, possibly higher for NO
O	15%	More	RO is 20% more profitable than NO
P	Small %	More	RO is not necessarily more profitable
U	10%	More	RO reduces 5% of the costs

Table 7: Repeat Business issues for companies with ETO(p) customisation

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