

**Identifying core competences for diversification: a case study of moving  
from the construction industry to the leisure marine sector**

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## **Identifying core competences for diversification: a case study of moving from the construction industry to the leisure marine sector<sup>1</sup>**

### Abstract

- This paper addresses a significant gap within the present body of work on the resource based view of the firm. That is the lack of empirical research on the resource based perspective within the SME sector (Newbert, 2007).
- This study applies the resource based view and core competence analysis in particular in a very practical situation: a small manufacturing firm in the UK. The study is the result of a two year “action research” project where the researcher was embedded within the firm. The manufacturing firm supplies hydraulic tube assemblies to the yellow construction industry and has experienced rapid growth over the past ten years. Using a causal mapping methodology the findings reveal distinctive capabilities that the firm is able to use as a basis for diversification into the Leisure Marine industry.
- The findings contribute to the body of literature on the resource based view of the firm by providing a methodological approach which helps to uncover core competencies in practice.

## **Introduction: Growing a successful manufacturing firm**

Diversifying away from your main business and revenue stream that has provided a stable and profitable business for over thirty years is full of risks and uncertainty. This paper illustrates how a manufacturing company in the UK, supplying one of the UK's fastest growing private businesses: AED<sup>i</sup>, set about this difficult task using core competence analysis as a basis for diversification.

Founded in 1972 and now located in Dorset, Steel-Tubes Limited<sup>ii</sup> has extensive experience in the tube manipulation industry and in particular the fabrication of rigid hydraulic tube assemblies for the construction machinery market. Steel-Tubes is a leading supplier to the yellow goods industry, with an established customer base which includes JCB, Caterpillar and Hitachi. With a turnover of £15m, the company is one of the largest tube manipulators in the UK. While Steel-Tubes has been successful, with constant growth in turnover and employees, it has grown into a position where 80% of the business is from one customer. This is, however, a strategy that Steel-Tubes purposely undertook approximately seven years ago. Having seen the potential growth of AED, over the past five years it focused on growing the business from 50% to 80% from AED. Having captured this growth the longer term strategy is now on reducing the dependency on the single customer and the yellow goods industry.

It is sometimes easy to overlook the success the company has achieved in growing the business from £9m to £15m over the past five years. While this has largely been supplying a single customer, this customer has been very demanding and continues to be so. For example, orders are placed with lead-times of several months, but changes are made to these orders a few weeks prior to delivery. Furthermore, a JIT manufacturing system does not allow for suppliers to operate late deliveries. Operating within such a manufacturing environment demands a range of special skills not just in manufacturing but also in quality management, logistics and customer service. Furthermore, the quality standards set for the products being produced are equivalent to the highest in the industry. And the products produced perform in harsh and demanding environments. Steel-Tubes has so far managed to fight off competitors who have entered the market by offering a better quality product

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<sup>i</sup> The name of the firm has been changed to ensure anonymity.

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delivered on-time. Indeed, competitors have found it difficult to meet the demanding requirements of the customer- AED. By any measure this small company in Dorset is an example of a successful manufacturing company producing high quality steel products on-time every week for an industry leading company.

All these successes have been achieved within a firm of 250 employees, 230 of whom work on the factory floor. The firm can be characterised by its craft-based approach to manufacturing and quality. Emphasis is placed on quality and service rather than on efficiency and cost minimisation. The very small management team is headed by an accountant with many years of experience in this and related manufacturing industries. The small group of managers within the firm have few formal qualifications (the MD is one of only two with a university education), but many years of industry experience. It is this in-depth knowledge of the industry and the customer that seems to play a significant role in the firm's success. The Managing Director, however, is aware of the limited formal business expertise within the firm to analyse and develop a strategy for diversification.

The yellow goods industry continues to grow with JCB competing with Caterpillar and CNH of the US, Komatsu of Japan and Volvo of Sweden. Competition is fierce and while there is growth AED continue to put further pressure on its suppliers to lower costs and demand more for less. The dependency on one customer however is also growing and will continue to grow as long as sales from AED outweigh total sales from other customers. This causes problems for Steel-Tubes as AED is able to dictate terms that are disadvantageous, such as demanding short lead times and instant response to new or adjusted orders which causes disruption in production. Dependency on one customer in a focused industry means that Steel-Tubes is vulnerable to changes in AED's strategy, as well as changes in the construction machinery industry. AED is also realising the potential threat that being dependant on a sole supplier poses to their business and is currently looking at secondary suppliers for hydraulic tube assemblies. Having recently expanded into China and India, it is reasonable to conclude that AED may also be planning to outsource parts from these countries in the future.

Given this situation the key challenge for Steel-Tubes was how to identify a strategy to diversify and enable it to build a business to generate a revenue stream beyond the yellow

goods industry. This raises many questions. Not least of which is the firm able to undertake the work necessary to devise such a strategy? Over the past few years the senior management team have discussed the diversification issue many times. Opportunities for diversification almost always resulted in the usual suspects: products that contained steel tubes: golf trolleys, tubular furniture, lamp posts, etc. The senior management team recognised that if it was to undertake a rigorous diversification analysis it did not have the resources or necessary skills internally to undertake such an exercise. In 2006 Steel-Tubes secured a two year DTI KTP Associate for two years to help it develop opportunities for diversification. This was the preferred method of choice for the Managing Director of Steel-Tubes. This was partly because he wanted to work closely with the project and recognised that there were many idiosyncrasies with the business that would take a long time to appreciate and understand. Given the available resource, a two year project leveraging in expertise from a Business School seemed to offer the opportunity for a research project that would involve learning over a longer-term period (these are also the conditions most suitable for “action research”). This was in preference to external consultancy firms whose approach and methodology would almost certainly have been on a much shorter timescale, especially given the available resource. The next section explores the strategic management literature in general and the resource based view of the firm in particular with respect to diversification.

### **The concepts of the RBV and Core competence analysis**

For the academic discipline of strategic management the landscape has changed considerably in little more than ten years. The RBV emerged as the contemporary and dominant approach to strategy development. Virtually all the strategy journals and most of the business and management journals featured articles written from a resource based perspective. Moreover, the language of the RBV such as resources, capabilities and competences now fill the mainstream business press. So what are the key concepts of the RBV?

If the RBV is dependent on the two key principles of: firms are different and these differences are relatively stable, then a key question arises, which is: how does one identify these differences that determine the success of a firm? It is the detail that is significant here. Here, by differences we mean strengths and it is around this concept of strengths that so much of the debate has taken place.

Strengths have been interpreted as resources, capabilities and competences (Wernerfelt, 1984; Barney, 1991). Hamel and Prahalad (1994) developed the idea of core competence for a very specific type of resource. Indeed, they developed three tests that they argue can be used to identify core competencies, namely “customer value”, “competitor differentiation” and “extendibility”. Yet, despite the widespread acknowledgement of the salience of core competencies for acquiring and sustaining a competitive position, the notion of core competencies has remained largely amorphous (Onyeiwu, 2003). Indeed, there is a tendency in the literature to characterize core competencies as any asset that enhances firm performance. According to Hamel and Prahalad (Op. Cit.) a firm’s ability to generate profits from its technology assets depends on the level of protection it has over these assets and the extent to which firms are able to imitate these competencies. For example, are competencies at the periphery or the centre of a firm’s long-term success? If they are at the centre and difficult for firms to imitate then long-term profits are assured; for example, over the past fifty years few firms have been able to imitate ‘Honda’s’ success in developing performance engines.

Increasingly economists are using the notion that firms possess discrete sets of capabilities or competencies as a way of explaining why firms are different and how firms change over time. To summarise they are: that competitive advantage resides not in a firm’s products but in their competencies. These are defined as knowledge, skills, management processes and routines acquired over time that are difficult to replicate- this is most likely because they are constantly changing them and updating them. However, knowledge or technology in itself does not mean success; firms must be able to convert intellect, knowledge and technology into offerings that customers want. This ability is referred to as a firm’s competencies: *the ability to use its assets to perform value-creating activities*. This frequently means integrating several assets such as: product technology and distribution; product technology and marketing effort; distribution and marketing. Indeed, it is the investment in intangible assets that seem to be determinants of core competencies (Onyeiwu, 2003).

### RBV and dynamic capabilities

It is Jay Barney (1991) that is considered by many to have made a significant contribution to the debate on the RBV when he argued that there can be heterogeneity of firm level differences among firms that allow some of them to sustain competitive advantage. He therefore emphasised strategic choice, where responsibility lies with the firm's management to identify, develop and deploy resources to maximise returns. He further proposed that above industry average rents can be earned from resources when they are: Valuable, Rare, Imperfectly Imitable and Non-Substitutable (so called VRIN attributes).

A key issue for debate within the literature has been over what form resources take. It is now widely accepted that resources include tangible ones such as patents, properties, proprietary technologies and intangible resources such as relationships and trust built up over time (Galbraith and Galvin, 2004). It is this wider interpretation of the concept of resources and in particular the recognition that resources include information, knowledge and skills that has further developed the concept of RBV.

Significantly, the idea that firms develop firm specific routines as they conduct their business differentiated the concept of RBV from the more static 'SWOT' framework. Teece, Pisano and Shuen (1997), put forward the idea that firms develop dynamic capabilities that are difficult to replicate and it is this that makes firms different. This seems to chime well with Edith Penrose's (1959) ideas that it is resources that enable firms to create services or flows. But the technology capability of the firm frequently dictates what is possible and what can or cannot be achieved in a given time frame, hence a firm's opportunities are constrained by its current position and current knowledge base, i.e. it is path dependent. This introduces the notion of technological trajectories (Nelson and Winter, 1982; Dosi, 1982). Acquiring knowledge about technology takes time involves people, experiments and requires learning. To exploit technological opportunities a firm needs to be on the 'technology escalator', that is, firms cannot move easily from one path of knowledge and learning to another. According to Teece et al. (1997), the choices available to the firm in terms of future direction are dependent on its own capabilities; that is, the firm's level of technology, skills developed, intellectual property, managerial processes and its routines. Furthermore, they argue the choices made by any firm must take place in a changing environment; characterized by changing levels of technology, changing market conditions and changing societal demands.



Teece et al. (op. cit.) refer to this concept as the dynamic capabilities of firms. This is significant within the debate on the RBV as it implies a shift in focus from protecting rare, inimitable, and non substitutable resources (so called VRIN framework) to continuously creating resources and capabilities in order to compete (Kogut and Zander, 1992; Teece et al., 1997; Winter, 2003).

In a review of the empirical research on RBV of the firm Newbert (2007: 137) examines the issue of distinguishing between resources, capabilities and core competencies and finds: *“it is perhaps no surprise that capabilities and core competencies have been found to be far more significant in explaining competitive advantage and performance than resources.”* Newbert further argues that resources have received a great deal of empirical attention because relative to capabilities and core competencies they are easy to measure. For example, the construct human capital is the most widely studied resource as it can be operationalised along dimensions such as demographics in certain roles/positions; whereas capabilities and core competencies are difficult to access and to identify. Indeed, he presents the identification of capabilities and core competencies as a major methodological challenge which necessitates a greater need for primary data collection techniques and will by its nature introduce a greater potential for respondent bias.

#### Core competencies as a basis for diversification

The RBV emphasises the theme of sustained success within the research, diversification can be viewed as the other side of the same coin. It is growing the firm through utilising the firm's resources, capabilities and competences, which is at the heart of this approach to strategy development (Clark, 2000). The commonly accepted theory of diversification is simply put: it is the resource based perspective.

The previous discussions illustrate that there has been a considerable discussion amongst academics on the pages of many of the highly regarded strategic management journals. Indeed, despite the confusion that exists regarding terminology much of the debate has focussed on the validity or not of RBV as a theory (see Gibbert. 2006a; Gibbert 2006b; Levitas and Ndorfor, 2006) and furthermore all the practical applications have been within multinational firms and from a corporate level perspective. Empirical research in this field is almost entirely focussed upon large and multi-business organisations, with the result that the

vast SME sector has been largely ignored. Indeed Petts (1997) and Mills and Platts (2001) argue that there has been little application of the concepts to SMEs manufacturing or otherwise. While this may be a function of the “growing pains” of the school of thought, this represents a significant gap within the present body of RBV/competence literature. It is not our intention here to test the validity of the RBV framework. Rather we aim to show how the theoretical framework and an empirical method could be used by managers of firms. This study attempts to apply the resource based perspective and core competence analysis in particular in a very practical situation: a small manufacturing firm in the UK. The research questions therefore are:

- i) What are the core competences of Steel-Tubes Ltd?
- ii) How can core competences be identified within a small manufacturing firm?
- iii) How can core-competences be used as a basis for diversification?

### **Methodology**

Given that the Associate was to be embedded within the company working alongside the senior management team, the research lends itself to an in-depth study of the firm’s resources and core-competencies. The research methodology adopted for this project is most accurately described as action research. Action research is problem centered, user centered, and action oriented. It involves the firm and its members in active-learning, problem-finding, and a problem-solving process. It adopts a “scientific” method in the form of data gathering, forming hypotheses, testing hypotheses, and measuring results; this is an integral part of the process (Johnson, 1976). In particular, however, data are not simply returned to the firm in the form of a written report, but instead are fed back in meetings, and the firm and the researcher collaborate in identifying and ranking specific problems, and in devising methods for finding their real causes. In this study an iterative inquiry process was developed within Steel Tubes, which led to data-driven collaborative research in the form of three phases of enquiry to understand underlying causes. Furthermore, these findings have been used to try to develop organisational change (Reason & Bradbury, 2001).

Identifying resources and competencies within firms presents a considerable challenge to researchers. This is particularly so when there are strong relations of complementarity and co-specialisation among individual resources, so that it is not necessarily the individual

resources, but rather the way resources are clustered and how they interact with one another; that is, important to a firm's competitive advantage. Causal maps provide a method of analysis for researchers and managers within firms to uncover complex systems in the areas of quality, strategy, and information systems (Fiol and Huff, 1992). These causal maps are known by many names, including Ishikawa (fishbone) diagrams, cause-and-effect diagrams, impact wheels, issue trees, strategy maps, and risk-assessment mapping tools. Causal maps can be used by managers to focus attention on the root causes of a problem, find critical control points, guide risk management and risk mitigation efforts, formulate and communicate strategy, and teach the fundamental causal relationships in a complex system (Scavarda et al., 2006). In the social sciences, a causal map is generally considered to be a particular type of cognitive map, which is an individual's mental model of the relationships (causal or otherwise) among the elements of a system. Typically, causal maps are drawn with nodes representing concepts, ideas, or areas. The nodes are linked with unidirectional arcs that represent beliefs about the causal relationships among these nodes. Synthesizing causal maps from a number of respondents results in a "collective causal map."

Eden and Ackerman's modelling of competences using a causal mapping methodology is ideally suited to identifying relationships between assets, distinctive competencies and outcomes. The mapping process using diagrams facilitates managers within the firm to identify and recognise relationships between capabilities where previously they were unrecognised. The relationship between patterns of competencies and the goals of an organisation are used as the basis for establishing core distinctive competencies and for developing and exploring the business model which informs strategic direction (Eden and Ackerman, 2000)..

The analysis in this paper relies on content analysis and cognitive maps. Cognitive maps have been defined as:

*'graphic representations that locate people in relation to their information environment. Maps provide a frame of reference for what is known and believed'. (Fiol and Huff, 1992: 267).*

There are many different types of cognitive maps for example causal maps (e.g. Bougon et al., 1977) have been extensively discussed and used in the management literature (see the special issue of the Journal of management Studies, 1992, 29(3) for a review). In our study presented here, the cognitive maps are derived using Eden and Ackerman's framework (Eden and Ackerman, 2000). The cognitive maps produced in the study can be interpreted by drawing on the insights offered by personal constructs (Homer and Oliva, 2001; Pavlov and Saeed, 2004; Howick et al., 2006).

Cognitive mapping is a soft systems approach that enables the researcher to establish people's views and why they hold these views. The technique is fairly simple to use and hence does not require extensive training; typically the interviews last about an hour (Eden, 1983). Furthermore, it is a modelling technique that elicits a person's understanding of a process in their own words. The constructed cognitive map (model) uses the participants own language and thus facilitates ease of understanding of the model. This is particularly important for receiving feedback on the developed model. Immediate problems are presented if the model cannot be easily understood by the participant.

A number of studies have suggested that an in-depth interview, of the style required for cognitive mapping cannot be started without detailed knowledge and preparation (Marshall and Rossman, 1989). Burgess recommends that it is essential to get to know the people before detailed conversations can occur. In this case this criterion has been met following the immersion within the organisation by the Associate for two years. Table 1 illustrates the additional information and data to which such a process provides access. The direct interactive modelling technique of cognitive mapping, using elite semi-structured interviews was thus selected as an appropriate method for revealing the core competencies of the organisation.

The research was designed in three phases. Phase 1 was an exploratory approach using Focus Groups to uncover competencies and capabilities within the firm. Phase 2 examined and evaluated the identified variables in more detail. Phase 3 explored links and relationships between the variables using a mapping technique.

[Insert Table 1 here]

#### (i) Phase One Focus Groups

In order to gain a perspective from the different management perspectives the Focus Groups were divided into two groups: senior managers (five) and middle managers (seven). By dividing the sessions into these groups the fear of any repercussions from senior colleagues is limited and more honest and complete findings were more likely. The sessions were tape recorded and anonymity was assured. The questions were designed to be explorative and to create discussion within the groups (see Table 2). The questions selected were split into groups with each group aiming to cover a different objective. One group of questions aimed to identify resources and capabilities and the other to discover informal systems within Steel-Tubes.

[Insert Table 2 in here]

In order to triangulate the findings from Phase 1 and to avoid inbuilt bias, interviews were held with two of the firm's major customers and two potential customers to identify requirements that were seen as necessary in order to compete and be successful in the yellow construction goods industry. These findings were compared to those identified internally in Phase 1.

#### (ii) Phase Two Focus Groups

In the second session the senior and middle management groups were combined. The objective this time was to establish which of the issues raised during the previous sessions are core to enabling Steel-Tubes to compete and which ones are key to Steel-Tubes's success. This was done in the form of an attribute scoring exercise, where each of the participants scored the success factors identified in the previous sessions in terms of importance (see Appendix 1). Discussions of why people scored the attributes the way did then took place with the emphasis on the difference between senior and middle management views. Hafeez, Zhang and Malak (2002) designed a scoring exercise as part of the methodology outlined in their paper and this was used as a template. By scoring the attributes of a company it is easier to identify the importance of each one in relevance to the others. This is important as it is the relationships between the attributes which are considered to underpin a company's competitive advantage and which are likely to lead to

core competencies (Wernerfelt, 1984; Barney, 2002; Eden, 2006 and Hamel and Prahalad, 1994).

### (iii) Phase Three Focus Groups

For the third sessions, the participants were split into the two groups in Phase 1. This session was designed to build on the findings from the previous sessions and aim to determine the relationships between the identified attributes. Causal mapping was used in the third phase of focus groups as it offers a visible method of showing linkages between the capabilities and resources that were identified in the earlier sessions. The key objective was to establish assets, capabilities and outcomes and explore linkages between them through the development of a collective causal map.

### Opportunities for related diversification

The final part of the research was to identify opportunities for diversification using the core competencies. The biggest challenge for this part of the research was addressing the scope and size of analysis required. In order to help narrow the search an initial screening was undertaken to try to identify those industries that were large consumers/users of steel tube. This was based on the initial guiding principle for the research that any market opportunity had to be related in some form to the firm's heritage and skills, (that is 25 years of bending steel tube) especially given the size of the firm and that resources are limited. This provides structure to the search and ensures that any opportunity will be realistic and less likely to be naive and impracticable. Hence, the diversification opportunities examined are related to existing technological capabilities. Having established the core competencies of Steel Tubes, these were to be used as a driver to identify possible opportunities and assess them for suitability in terms of diversification. The heavy users of small bore tubular steel were the starting point for the search and investigation. Clearly, the final business decision regarding choice of diversification will necessarily be based on traditional business information such as:

- Size of market
- Potential customers
- Volume of steel tube used
- Potential competitors
- Barriers to entry/ exit
- Resources needed for diversification
- Investment costs.

## Findings and analysis

All the sessions were approached by all the participants with a willing and positive attitude and this is reflected in the quantity and quality of the data gathered. The focus groups uncovered many resources and capabilities. Many of these were raised in both sessions suggesting that these may well be fundamental to Steel-Tubes's sustained competitiveness. It was clear after analysing the results from the focus groups in Phase 1 that the service Steel-Tubes offer coupled with the high quality products produced were key factors behind Steel-Tubes's success. The attributes that enable Steel-Tubes to be able to offer an exceptional service were identified as follows:

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(i) Accommodating production operation

An issue which was raised in both groups was the constant "disruption" to production. Having investigated this further, it seems disruption is caused to the order of the queues for processes. It was explained that although disruption to the order of the queues happens quite regularly, this has little effect on productivity or the actual production processes. This is an important issue to understand as it is the ability to deal with this disruption that enables Steel-Tubes to offer such an exceptional service to its customers. Further evidence of this ability is that approximately 33% of all parts produced are less than one year old, which suggests new products are introduced to the production line on a regular basis.

(ii) Experience in small batch production

This year, the average order has been approximately 300, with a range of 20 to 1500 but a mean average of 52 per batch. Further research is required however into batch sizes as this will be part of the criterion to investigate market opportunities and therefore it is important to understand what is meant by a small batch size and whether or not this differs between industries.

(iii) Extent and skills of the prototyping service

The benefits and negative effects of prototypes being developed on production machines needs to be explored, particularly the way in which Steel-Tubes is able to cope with this disruption on the production line caused by the prototyping service. This is further evidence

of the ability to deal with disruption; the way in which Steel-Tubes are able to control an environment where prototyping and the production line work harmoniously as opposed to working as separate entities in a traditional setup and as the literature would suggest is most effective. This is an important topic to understand as it is this control that allows Steel-Tubes to offer the exceptional service that they do.

(iv) A comprehensive in-house production service

Although this has been identified as a key success factor for Steel-Tubes it is not yet clear if this is a unique resource within the industry. Further investigation will need to be done to establish the full capabilities of the two plants in order to provide a basis for benchmarking against other companies.

(v) In-built capacity

More investigation is needed however, to discover what happens to orders that are at the back of the queues. It is not yet clear if the nightshift production schedule is orders which have been postponed during the day or if nightshift production schedules are postponed to accommodate incomplete orders from the day shift. If this is the case are orders constantly postponed until they are considered urgent or is there an in-built capacity in production which accommodates these postponed orders.

(vi) Planning and logistics

The Planning and Logistics department are responsible for ensuring the right parts are being pushed through the production line and that they get shipped on time. It is important to understand the way in which this is managed in order to benchmark this against other companies.

Good teamwork at the operational level and the knowledge of bending being tacit in individuals are two areas which also enable Steel-Tubes to offer an exceptional customer service. However, they are currently two issues which are relevant to the project but at present will not be investigated. This is because they will be more important when researching market opportunities and will offer bias as to whether or not opportunities are realistic.



### Factors and outcomes identified from customers

The interviews were held at the customer's place of business and lasted approximately one hour. Not surprisingly there was considerable similarity with those from within the firm. The key factors that were necessary for success in this industry were:

- i) On-time deliveries;
- ii) Quality;
- iii) Rapid response;
- iv) Competitive price;
- v) Experience of working within the industry;
- vi) Production planning & scheduling

Given the findings from Phase 1 variables i) to iv) were therefore identified as necessary outcomes rather than capabilities or assets. These feed into the causal mapping exercise in Phase 3.

### Analysis from Phase 2

Further analysis of each of the capabilities identified was undertaken using a scoring method based on the work of Hafeez, Zhang and Malak (2002). By scoring the attributes of a company it is easier to identify the importance of each one in relevance to the others. This is important as it is the relationships between the attributes which are considered to underpin a company's competitive advantage which are likely to lead to core competencies. Barney (2002), Eden (2006) and Hamel and Prahalad (1994) recognise that some attributes are more important than others and that they have to be ranked in some form in order to be able to distinguish between ones which are crucial to core competencies (this is shown in Table 3).

[Insert Table 3 in here]

### Analysis from Phase 3

The findings from Phase 2 feed directly into Phase 3. Figure 1 shows a causal map with three layers. The outcomes at the top of the map can be distinguished from distinct competencies as they tend to be factors that are demanded by customers. These were identified by correlating findings from Phase 1 and the findings from interviews with customers. Whereas distinct competencies are the effect of processes within the firm (here a process is defined as a series of activities, which are linked together and managed). It is the ability to manage

distinct competencies that separates them from assets, which cannot be managed. The map illustrates many links and relationships that have been identified between the resources and capabilities. This illustrates how Steel-Tubes's flexible manufacturing system contributes to its success in terms of provision of service and how it is integral to Steel-Tubes. The two distinctive competencies that were identified through an analysis of Steel-Tubes's business model were:

1. Flexible production system allowing rapid response to orders.
2. Personal service to customers utilising specialist prototyping expertise.

As a final test for the validity of these core competencies, they have been compared to three questions devised by Hamel and Prahalad (1994):

1. Does it add customer value?
2. Does it differentiate your company from your competitors?
3. Does it offer a base of expansion for your company?

There is clear evidence from Steel Tube's main customer that it values the firm's ability to respond rapidly to its orders. Sometimes Steel Tube is able to turn round a request in twenty four hours. This is something that competitors are either unwilling (high cost implications) or unable to provide. The third test of validity is addressed in the next section. Furthermore, using Barney's (2002) VRIO framework it is possible to analyse the capabilities identified and explore whether there is congruence. Table 4 shows the attributes within the VRIO framework. This offers three attributes that have the characteristics of core competencies as identified by Barney. The distinctive competencies identified seem to satisfy all of Hamel and Prahalad's (1994) tests and Barney's (2002) VIRO framework, hence it is fair to conclude that the above are realistic core competencies for Steel-Tubes Limited.

[Insert Figure 1 in here]

[Insert Table 4 in here]

### Opportunities for related diversification

Table 5 shows the list of potential industry and market opportunities generated by discussions with steel tube suppliers into tube related sectors. Column 1 contains the long list of industry sectors that were identified by both steel tube suppliers as heavy users of small bore steel tube and tube bending machine suppliers as users of their machines. Columns 2 and 3 are the two core competencies for Steel Tubes identified by the earlier analysis. Each of these industries was examined with respect to these competencies to see if the competencies could be exploited. The emphasis of the analysis was on the industry structure, supply chains and nature of supplier relationships. There were two industries that provided a positive match with both of the core competencies: Leisure Marine Industry and Specialist Automotive.

[Insert Table 5 in here]

The predominant material used for tubular products in the marine industry is stainless steel. Similarly low volume automotive markets also use stainless steel tubular products. These two sectors contain characteristics that match the core competencies of Steel Tubes. In addition, stainless steel in these markets also carries a premium price due to the aesthetic value of the products. Another positive factor of producing small bore stainless steel tubular assemblies is the supplier gap within the marine industry, which should make for an easier market entry strategy.

### **Conclusions**

This paper has illustrated how a small manufacturing firm supplying the yellow construction machine industry was able to use core competence analysis to identify distinctive capabilities as a basis for diversification. Following this study Steel-Tubes Ltd decided to enter the Leisure Marine market. It has since secured its first order and supplied its first product: a stainless steel mast for radar to the UK's second largest producer of Leisure Marine vessels.

These findings provide some much needed empirical research from the SME sector which has thus far been overlooked within the area of the resource based perspective. Virtually all

studies using the RBV have focused on large multinational firms as a basis of analysis (Petts, 1997; Mills and Platts, 2001).

Furthermore, this study has shown how the core competences of an SME can be identified using a causal mapping methodology. The methodology to identify the core competences used here had three phases based on focus groups, a scoring process for competences and the development of causal maps (Hafeez, Zhang and Malak, 2002). The core competences were further evaluated using the tests suggested by Hamel and Prahalad (1994) and Barney (2002) and cross-checked with customers, suppliers and competitors. The analysis of core competences of the firm guided the diversification analysis. It is the relationship between assets and capabilities which is so crucial for small firms. This is especially so for small firms where the assets are likely to be on a smaller scale than that of large firms. For Steel Tubes it is the ability of the firm not only to have flexibility in its manufacturing operations, but also the ability to respond quickly to customer orders that seems to be central to the success of the firm's business model. Hence, it is agility in manufacturing rather than simply flexibility, which enables the firm to configure operations to order that gives Steel-Tubes its distinctive capability and core competence. Steel-Tubes has since invested further in this part of its activities and employed more people within its newly recognised capability- product prototyping.

The casual mapping methodology cited in this paper can be used by other SMEs, but it should be noted that the resources and skills required are significant. The mapping process requires extensive discussions between the lead researcher and individuals, both inside and outside the firm (Marshall and Rossman, 1989) and the organisation of the interviews and focus groups and the analysis of the data, all take time. In addition Steel-Tubes went through the KTP approval process with the DTI, recruited a graduate and then introduced that person to all aspects of the firm's operations. It was crucial during this period that the graduate was able to develop the trust and confidence of Steel-Tubes's management. The project also required the company's management to engage fully with the process.

Although technically employed by the Knowledge Transfer Partnership, the graduate spent virtually all of his time at Steel-Tubes Ltd. and in this respect was 'embedded' in the firm. He developed a highly detailed understanding of the firm, not only because he has been

there for more than a year at the time of writing but also because the mapping process demands extensive interaction with the company, suppliers, customers and to an extent competitors. So the experience of carrying out the analysis of Steel-Tubes suggests that it is essential for firms to ensure that a full and detailed understanding of the firm is developed during the process.

The findings offer support for Newbert's (2007) arguments relating to distinguishing between resources, capabilities and core competencies. The methodology presented here offers clear evidence of the challenges in attempting to identify a firm's core competencies. Indeed, the paper illustrates the high level of support and company involvement required in order to identify core competencies. It is therefore no surprise that resources have received far greater attention because, as this paper has shown, relative to capabilities and core competencies they are easy to measure.

## Figures and Tables

Table 1: Information available due to KTP project structure

	Immersion within the organisation provides access to:
1	Internal documentation
2	Attendance at and information from internal meetings
3	Information from informal discussions with colleagues
4	Confidential information
5	Historical and present data

Table 2: Phase 1 Focus Group Questions

1	Steel-Tubes does lots of things, but what does it do well?
2	Which activities do Steel-Tubes struggle to do well, and which ones do they do very well?
3	What formal and informal systems exist within Steel-Tubes to allow them to deliver benefit to their customers?
4	How do the formal and informal systems compliment Steel-Tubes's activities and how do they inhibit them?
5	What activities deliver the most customer benefit in terms of adding value?
6	What does Steel-Tubes do that competitors can't do? For instance, high quality, flexibility, cutting and plating their own products.
7	What resources does it have that help it to succeed?
8	Are these unique in any way?
9	In terms of unique capabilities are there areas in which Steel-Tubes has adapted and changed over the years which has enabled it to continue to be successful?
10	How are Steel-Tubes able to be so flexible?
11	How could Steel-Tubes offer the same level of service to other customers as they do to their major customer?

Table 3: Findings from Focus Group 2 Scoring

	Commercial Manager	Prototype Manager	Quality Manager	Logistics Manager	Dispatch Manager	Poole General Manager	Production Coordinator	Commercial Estimator	Production Manager	Production Director	Quality Controller	Total
Knowledge and experience of bending	1	4	3	4	5	5	4	5	5	4	5	45
Good teamwork at the operational level	2	2	4	5	4	3	5	5	4	5	4	43
Comprehensive in-house production capability	4	2	1	5	2	3	5	3	5	5	5	40
High perceived quality in the industry	2	5	3	2	5	4	4	4	4	3	4	40
Flexible accommodating production system	3	3	5	3	1	4	3	4	5	4	4	39
Extent and skills of the prototyping service	4	4	2	2	2	4	4	5	3	4	4	38
Planning and logistics systems	3	2	2	4	3	4	3	3	4	4	4	36
In-built production capacity	3	3	4	3	4	2	2	4	3	4	3	35
Experience in small batch production	2	2	4	1	3	4	4	2	3	3	3	31
Total	24	27	28	29	29	33	34	35	36	36	36	



Table 4: Steel-Tubes's competencies using Barney's (2002) VRIO Framework

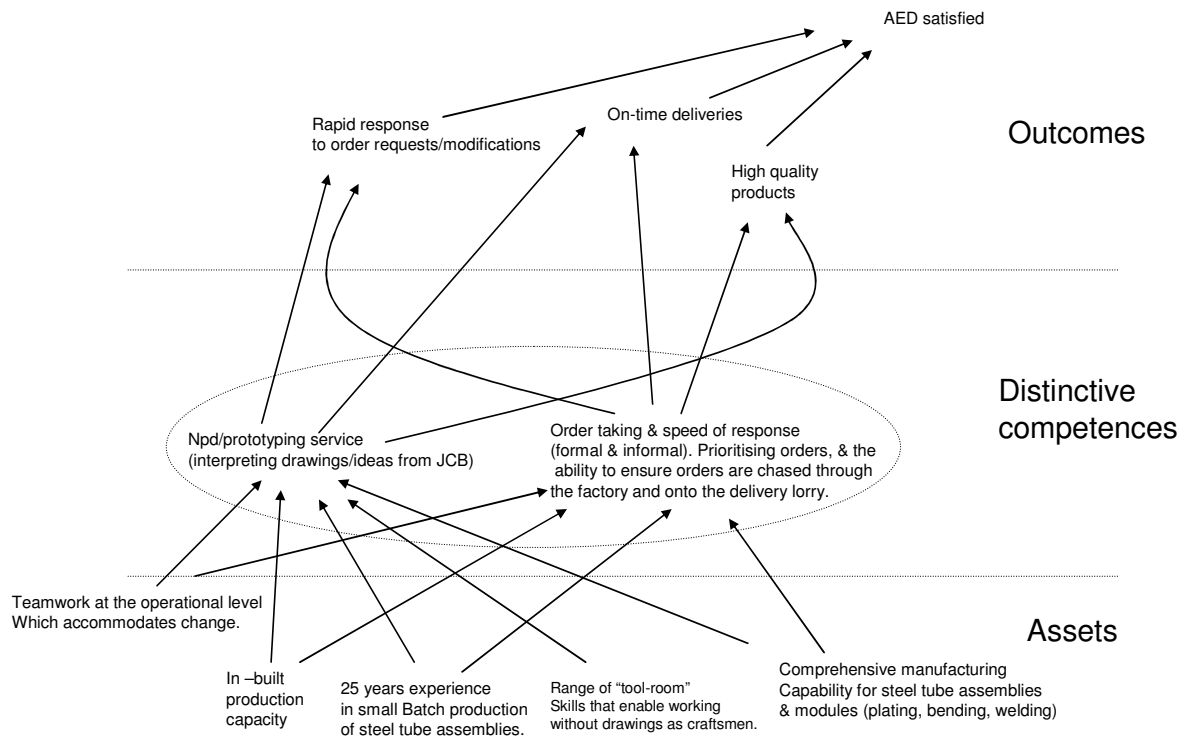
Attribute	Valuable	Rare	Costly to Imitate	Exploitable
Experience in small batch production	No			
In-built production capacity	No			
Good teamwork at the operational level	No	No		
Planning and logistics systems	Yes	No		
Comprehensive in-house production	Yes	Yes	No	
Knowledge and experience of bending	Yes	Yes	No	
Flexible accommodating production system	Yes	Yes	Yes	Yes
Extent and skills of the prototyping service	Yes	Yes	Yes	Yes
High perceived quality in the industry	Yes	Yes	Yes	Yes

Table 5: Analysis of opportunities for diversification

<b>Industry sectors that are heavy users of small bore steel tube</b>	<b>Flexible production system allowing rapid response to orders</b>	<b>Personal service to customers, utilising prototyping expertise</b>
Aerospace	X	
Agricultural equipment		
Agricultural process plants		
Air conditioners and heaters		
Boilers		
Composite substitutes for metal tubes		
Defence	X	
Healthcare		
Leisure equipment		
Locomotive		
Lorries/ buses		
Leisure Marine	X	X
Material handling		
Mining		
Offshore oil and gas		
Recycling and waste management		
Renewable energy		
Shop fittings		
Specialist automotive	X	X

Figure 1:

Identification of Core Competences  
Within Steel-Tubes: Collective cognitive map



**Appendix 1: Attribute Scoring Exercise**

Below is the list of attributes that have been identified as key to Steel-Tubes’s success. Using numbers 1-5 please score each of the attributes depending on how important you perceive them to be. 1 being of low importance, 5 being of high importance. However, you are only able to use the number 3 twice.

<b>Key Attribute</b>	<b>Score</b>
Comprehensive in-house production capability	
Experience in small batch production	
Planning and logistics systems	
Flexible accommodating production system	
In-built production capacity	
Extent and skills of the prototyping service	
Good teamwork at the operational level	
Knowledge and experience of bending	
High perceived quality in the industry	

## Notes:

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