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## Regular article

# Innovation and regional development via the firm's core competence: some recent evidence from North East England

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## ABSTRACT

This paper examines the nature of linkages between core competence of a firm and key characteristics of its product/output and thus presents an alternative theoretical framework for innovation and regional development. Within this framework, it is the externally observable characteristics of what a firm produces, rather than its internal functions, that establishes whether a core competence potentially exists, in order to operationalize it for R&D and innovation activities. To demonstrate potential applications of this framework, a literature-based-questionnaire was designed to collect primary data from 330 firms located in North East England, a peripheral region of the UK. Collected data were subjected to a detailed statistical analysis to estimate the conditional probability that a firm has a core competence, given the presence of one or more of its key output/product characteristics. Based on this approach, the paper presents a theoretical/empirical framework for the promotion of innovation via enhancement of a firm's core competence, and improvement in its output/product characteristics. This framework might be employed as a strategic management tool (1) by a firm to help in allocation of scarce resources for innovation and innovation management and (2) by regional policymakers for targeting and assisting firms in peripheral regions to enhance regional development via firms' innovation and exporting activities.

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## Introduction

What is the nature of linkages between a firm's core competence and key characteristics of its output? How can a firm's strategy for innovation and growth be set via improvement of its core competence and characteristics of its output? Moreover, how can policymakers in a peripheral region help to enhance regional growth via these activities? This study seeks to provide practical answers to these questions. It does this task by critically reviewing key contributions in this field to develop a theoretical framework and a classification system within which these questions might be addressed.

A good starting point for this review is the concept of a firm's core competence. A firm's core competence might be viewed as a firm's knowledge, knowhow, and skills, and it acts in precisely the same way as tacit knowledge does in aggregate growth models (Romer, 1990). That is its development, and refinement would lead to innovation activities and results in a firm's sustained growth over time (Bonjour & Micaelli, 2010). However, core competence is a multifaceted theoretical concept, and it is often vaguely defined

and hence difficult to identify and measure in practice (Schreyogg and Geiger, 2007; Hafsi and Thomas, 2005; Ljungquist, 2007). It involves several key internal processes for it to be created within a firm/organization. These internal processes include collective learning, effective communication, coordination of production skills, and capability to integrate multiple technologies (Prahalad and Hamel, 1990). Improvement in each of these internal processes, on their own, help to raise the level of knowledge, skills, and know-how within an organization, and when they are effectively managed and integrated, these processes collectively help to create core competencies that are difficult for rival organizations to replicate. These competencies would give an organization/firm not only competitive advantage over their rivals but also an innovative edge, enabling a firm to achieve sustained growth and exporting activities via continuous refinement of its core competencies over time (Seddighi, 2015; DeNisi, Hitt, & Jackson, 2009; Bogner, Thomas, & McGee, 1999).

Despite difficulties to identify and measure a firm's core competence in practice, there have been many attempts to devise practical procedures for its identification in the literature (Hafeez, Zhang, & ve Malak, 2002; Mascarenhas, Baveja, & Jamil, 1998; Javidan, 1998). Many authors appear to have developed their own distinctive processes; for example, Petts (1997) identified and encapsulated six elements of core competence components focusing on the sustain-

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ability of a firm. In a similar vein, Javidan (1998) suggested eight hierarchical criteria to identify a firm's core competence from a managerial perspective. Hafeez et al. (2002) developed an identification process focused on collectiveness and uniqueness. Later, Yang, Wu, Shu, and Yang (2006) developed a systematic and meticulous process covering a large number of capabilities. However, this framework demands enormous resources and analytical methods, and for these reasons, is not considered to be a practical solution for the identification of a firm's core competence (Ljungquist, 2007). Other attempts in this area, for example, frameworks based on continuous upgrading and reconfiguring of a firm's capability suggested by Bonjour and Micaelli (2010), are also found to be challenging to apply in practice (Ljungquist, 2007, 2010; Zoipoulos, Morris, & Smyth, 2008).

These attempts have mainly been focussed on the evaluation of various internal processes/functions of a firm and their operations in practice. However, internal processes are often complicated, and their assessment is a difficult task in practice. As a result, despite these attempts, currently, there exists a clear gap in the literature as to how the concept of the firm's core competence might be used and operationalized in practice. In this study, we aim to add to the theoretical and empirical literature in this field by taking an alternative approach to the operationalization of this concept. In particular, instead of focusing on internal processes/functions for operationalization of core competence, we will be examining key output characteristics and their potential linkages with the firm's core competence to operationalize this concept as a management-decision-making tool for innovation activities. To this end, we have followed the pioneering work of Prahalad and Hamel (1990) and focused on the linkages between a firm's core competence and key output/product characteristics identified by these authors. This theoretical framework will be shown to provide a practical strategic management tool to help in the allocation of scarce resources for innovation and growth at a firm level.

To demonstrate its practical applications, we have applied it to a sample of firms located in North East England. The choice of this region as the sampling frame of this study is not accidental. This peripheral region has been lagging behind other regions of England, notably North West and South East regions, in innovation, R&D, and exporting activities, registering the lowest incidence of these activities in recent years (NELEP, 2016b; Duke, Hassinik, Powell, & Puukka, 2006; Seddighi, 2015). Given the predicted adverse impact of Brexit on the North East economy (NELEP, 2016b), there appears to be an urgent need for a practical strategic management tool that firms, as well as, regional policymakers can use to enhance regional growth via innovation and exporting activities.

The structure of this paper is as follows: In Section. 1, we examine the nature of linkages between a firm's output/product's characteristics and its core competence and attempt to develop a theoretical framework for an empirical investigation. In Section. Two, we discuss this study's questionnaire, its sampling frame, and data collection method. In Section. Three, we present some empirical results and based on these, present a strategic management tool and demonstrate how it might be employed in practice, finally, in Section. Four, we offer a summary and conclusion.

### Towards development of a theoretical framework for innovation and growth

In a pioneering work on the concept of a firm's core competence, Prahalad and Hamel (1990) suggest that a firm's core competence should generate output/product characteristics of (1) value-generation, (2) inimitability and (3) ease of access to a wide variety of markets. That is a theoretical /empirical relationship might exist between a firm's key product/output characteristics and a firm's

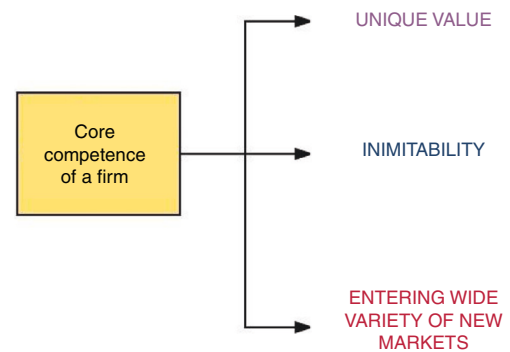


Fig. 1. A firm's core competence and its output characteristics.

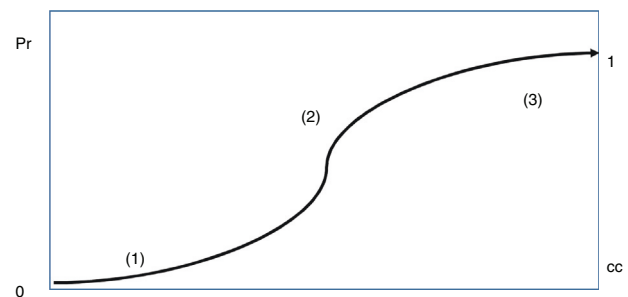


Fig. 2. Relationship between probability of a firm's core competence and an output characteristic. (cc, core competence of a firm; Pr, Probability).

core competence. This proposition is supported by current literature (see for example Gokkaya and Ozbag, 2013; Bonjour & Micaelli, 2010; Srivastava, 2005; Hafeez et al., 2002; Agha, Alrubaiee, & Jamhour, 2012; Gilgeous and Parveen, 2001; Hafeez & Essmail, 2007; Jabbbouri and Zahari, 2014; Sisman, Gemlik, & Yozgat, 2012). Fig. 1 depicts this relationship, under the underlying assumption that, the presence of one or more of the above output characteristics is likely to be associated with the presence of core competence. This is a classification problem, as a firm either has a core competence or not given its output characteristics, however, using this framework, it is possible to estimate the conditional probability that a firm has a core competence, given the presence of one or more of these output characteristics. For this purpose, we have formulated a logistic probability function, Fig. 2, in an attempt to replicate various phases that might occur in the interaction between a firm's core competence and each one of these output characteristics. Stage (1) is indicative of a low probability of a firm having a core competence, for a given value of each one of the aforementioned characteristics, Phase (2) is an active phase, in this phase, the conditional probability of a firm having a core competence rises at an increasing rate, until it reaches phase (3), where an output characteristic is well developed, and a firm has a high probability of having a core competence. Once phase (3) is reached, this probability remains high but stable and no longer increases. These dynamic phases are shown in Fig. 2.

Within this theoretical framework, it is the externally observable characteristics of what a firm produces, rather than its internal functions, that establishes whether a core competence potentially exists, in order to operationalize it for R&D and innovation activities. This approach to operationalization of the firm's core competence is radically different from conventional theoretical approaches which, by and large, have been focussing on the evaluation and enhancement of internal processes and functions of a firm for identification and development of its core competence. These frameworks are difficult and costly to apply in practice, and have

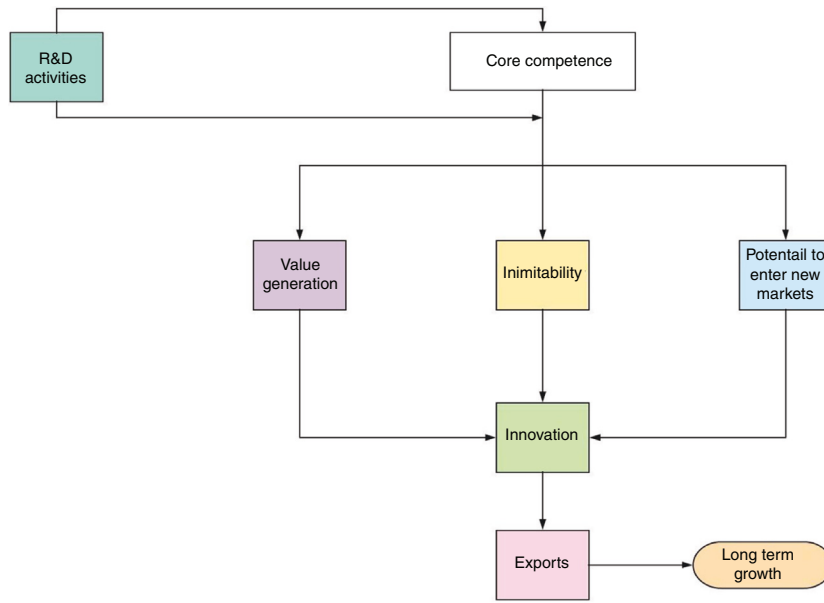


Fig. 3. Empirical framework.

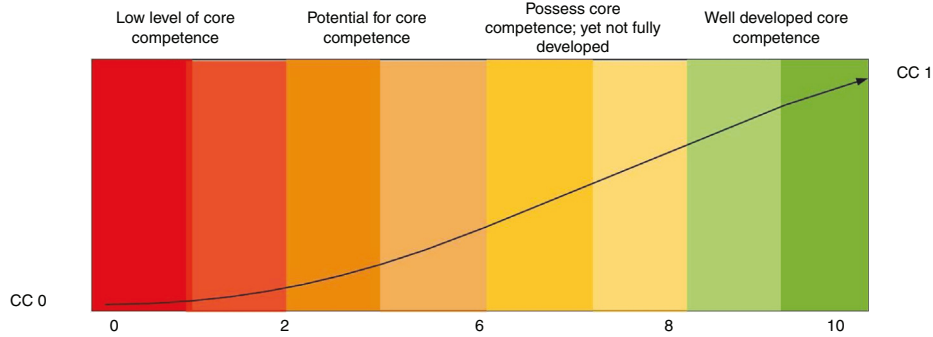


Fig. 4. Core competency level of firms.

161 been shown to be incapable of directly operationalizing the concept  
 162 of firm's core competence for innovation in practice (Ljungquist,  
 163 2007, 2010; Zoioopoulos et al., 2008).

164 Within our framework, a firm's strategy for growth is based  
 165 on improving its core competence over time in order to facilitate  
 166 innovation and exporting activities. This is done via R&D activi-  
 167 ties, which are mainly targeted at improving the aforementioned  
 168 output characteristics, given the relationship between these char-  
 169 acteristics and the firm's core competence within this theoretical  
 170 framework. Fig. 3 presents a pictorial version of this theoretical  
 171 framework.

172 One can generalize this theoretical framework to classify firms  
 173 into various categories according to the value of the conditional  
 174 probability that a logit regression model would generate to pro-  
 175 vide a practical classification system for strategic management and  
 176 policy initiatives to assist firms in their innovation activities. Fig. 4  
 177 presents a pictorial demonstration of this type of classification sys-  
 178 tem. In this hypothetical example, a green segment of the grid  
 179 (scores of 8-10) indicates those firms with a high probability of  
 180 having well-established core competence and thus a high innova-  
 181 tion/exporting activities; yellow grids represents (scores of 6-8)  
 182 those firms that possess core competencies that are not yet fully  
 183 developed. Orange segments (scores of 4-6) indicate those firms  
 184 that have a good potential to develop core competencies. Finally,  
 185 red (scores of 0-4) indicates those firms, which have a low proba-  
 186 bility of having/developing a core competence, given one or more

187 of their output characteristics. In section 3, we will empirically  
 188 demonstrate how this classification system might be used as a  
 189 strategic management tool for innovation in practice.

190 **Questionnaire and data collection method**

191 *Questionnaire*

192 Table 1 presents literature -based questionnaire carefully  
 193 designed to collect data on each aforementioned output charac-  
 194 teristics used in this framework.

195 *Data collection*

196 Data was collected via a sampling frame consisting of firms  
 197 listed in NEPIC and NECC directories which together cover 3300  
 198 production-based firms in North East England. To ensure generaliz-  
 199 ability and to avoid bias in the data, a systematic stratified sampling  
 200 method was used in this study. Furthermore, to generate a 95%  
 201 confidence level for various statistical tests to be carried out later,  
 202 the minimum sample size required for a population of 3,300 was  
 203 determined to be 330 firms. However, the actual sample size was  
 204 determined as 1100 firms to allow for the anticipated low response  
 205 rate in this region. Table 2 present the distribution of the firms  
 206 selected for this sample.

207 Table 3 illustrates the breakdown of the responses received.

**Table 1**  
Research questionnaire.

Variables		Question	Literature
Ownership		What is the nature of the ownership of your company?	Dixon and Seddighi (1996); Seddighi and Huntley (2007)
Date of establishment		How old is your firm?	Dixon and Seddighi (1996); Seddighi and Huntley (2007)
Sales of firm		What is the turnover of your firm?	Dixon and Seddighi (1996);
The core competence of a firm		Does your firm have a core competence on which it concentrates many of its resources/activities?	
Value Generation	A firm's competence or its key capability should be considered to be "core" to the firm, only if it has the potential to generate an exclusive customer -value	Have you ever developed/added unique value to a product or service to which customers are attracted to/willing to pay extra?	Prahalad and Hamel (1990); Clark (2000); Gilgeous and Parveen (2001); Jabbbouri and Zahari (2014); Hafeez et al. (2002); Sanchez and Heene (1997); Özbag (2013); Sisman et al. (2012)
Inimitability	Inimitability of a firm is dependent on how effectively a firm can transform the tacit knowledge embedded in human beings into an organizational system via the organizational learning process.	Does the firm have intensive organizational learning so that you do not struggle when a key employee leaves the firm?	King et al. (2001); Özbag (2013); Spender and Grant (1996); Hafeez et al. (2002); Prahalad and Hamel (1990); Esinehardt and Santos (2000); Kimishiraj and K Aino (2013)
Potential to access new markets	A firm's capability to access a wide variety of new markets is a key output characteristic which is often generated by a firm's core competence, and it is a good indicator that a firm has a core competence	Has the firm been able to enter a new product/market recently?	Gokkaya and Ozbag (2015); Srivastava, (2005); Hafeez et al. (2002); Agha et al. (2012); Gilgeous and Parveen, (2001); Hafeez and Essmail (2007).
R&D activities of a firm		Does your company use its R&D budget/activities for innovation?	
Informal R&D activities		Does your firm have informal R&D activities?	
R&D enhancing a firm's core competence		Does your company use its R&D budget/activities to develop/enhance its core competence?	Coombs (1996); Eisenhardt and Martin (2000); Abell et al. (2008); Cynthia et al. (2012); Hafeez et al. (2002); Schimpf and Binzer (2012); Harris and Trainor (2009); Quelin (2000); Winter (2003); Zollo and Winter (2002)
Innovation		Does your firm have collective research activities/budgets for product/process development	OECD (2005); Department of Industry, Innovation, and Science, Government of Australia (2013); Torkkeli and Touminen (2002)
Exports		What percentage of your sales in the last year were exported?	Gourlay et al. (2005); Love and Mansury (2009); Ganotakis and Love (2011); Saemundsson and Dahlstrand (2005)
Constraints on R&D and innovation activities of the firm		What is the primary constraint on R&D activities and innovation in your company?	Pisanio (1990); Glante (1996); Santamaria and Surroca (2011); Seddighi (2012); Das and Teng (2002); Tether (2002); Basilio and Moreno (2014); European Commission (2013); Zuniga (2010); Edwards et al. (2010); Casello et al. (2014); Majeweski (2004); Ahuja (2011); Conte and Viarelli (2013)
Staff turnover		What is your firm's staff turnover per year?	NELEP (2016b); IIPR (2016); ONS (2016, 2017) <sup>1</sup>

<sup>1</sup> NELEP = National Employment Law Project; IIPR = Institute for Public Research; ONS = Office of National Statistics.

## Empirical results

In order to operationalize this theoretical framework, the first task is to estimate the relationship between a firm's core competence and each one of the aforementioned output characteristics. To this end, we have specified a logistic probability function and have followed a Specific to General methodology estimating: (1) a series of bivariate logit regressions of core competence (Y) on each output characteristic x, and (2) a general logit regression model of (Y) on all three characteristics  $\times 1$ ,  $\times 2$  and  $\times 3$ , using a SPSS software Package. (Please see Supplementary Appendix A for details of the logit regression model used in this study).

Table S1 (Supplementary Appendix B) Presents the logit regression results for estimating the conditional probability of a firm's

core competence, given each output/product characteristics in turn. The results appear to be statistically significant in all three cases. Taken together, the Wald statistics and the *p*-value of each case, indicate to the statistically significant association between a firm's core competence and each output characteristic generated by a firm's core competence. In particular, this is evident from the estimate of the odds ratio, (*Exp (B)*) of each output/product characteristics. Similarly, Table S2 (Supplementary Appendix B), presents estimation results of the multivariate logit regression model where all three-output characteristics are present in the logit equation. The results indicate a statistically significant relationship. It is also interesting to note that, among the three characteristics, the presence of a firm's potential access to new markets appears to be the most significant factor contributing to the conditional probability

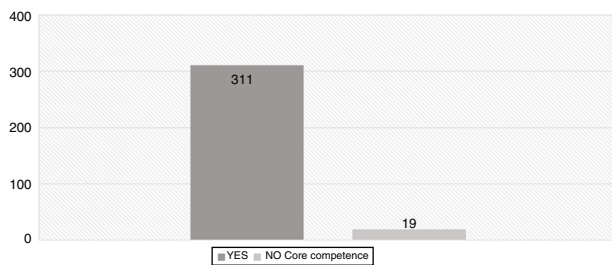


Fig. 5. Firms with a core competence in North East England.

of a firm having a *core competence*. This observation appears to be consistent with recent literature in this area (Danilovic and Leisner, 2007; Özbağ, 2013, p.11; Hafeez et al., p.30; Bonjour & Micaelli, 2010, p. 5; Fiaz, 2014).

#### Applying the theoretical framework : the case of North East England's firms

As the identification of a firm's core competence is the lynchpin of the concept (Clark, 2000), several auditing methods and pathways have been modelled in the strategic research domain however, the key attraction of the approach developed in this study is that it offers firms a secure mechanism to identify and develop their core competences and takes the theoretical framework into an operational level.

In order to demonstrate how the above theoretical framework might be operationally employed as a strategic management tool in practice, we have selected 330 firms in our sample data of North-East England firms and based on the Logic regression results, have listed their respective scores (See Table 4). In calculating these scores the following steps were taken:

- 1 Each company in our sample was directly asked, via the questionnaire, whether they believe they have a core competence. The data suggests that of the 330 firms, 311 of the reported they possess core competence. (See Fig. 5)
- 2 All companies were then assessed against the three externally observable output/product characteristics of (1) potential access to a wide variety of markets, (2) difficulty to imitate their products, and (3) generating a value to customers, and mapped to the logit analysis results (see Supplementary Appendix B and C) in order to calculate the points of their core competencies within our scoreboard /classification system (See Supplementary Appendix C)
- 3 Each firm assigned a score by their presence of critical indicators of a firm's core competence.
- 4 The resulting spectrum consists of four segments with distinctive colors, using calculated scores in step 3; each company was then placed in this core competence –spectrum (See Fig. 4).

#### Key sample findings

- We have found that firms whose output/products are (1) difficult to imitate, (2) have access to a wide variety of markets and (3) generating a perceived value to customers are highly likely (over 99%) to have a distinct core competence. Furthermore, amongst these output characteristics, the ability to access a wide variety of markets is found to be the best indicator of the existence of a firm's core competence in our sample. Furthermore, these firms are, by and large, active in R&D, innovation and exporting activities. These findings appear to support the theoretical foundation of the suggested framework, and thus providing an alternative method, based on the output characteristics of a firm,

Table 2  
Distribution of firms.

Sector	Number of firms
Manufacturing	209
Engineering	215
Processing	130
Services	546
TOTAL	1,100

Table 3  
illustrates the breakdown of the responses received.

	Emails sent	Number of Responses	Percentage of responses
Manufacturing	209	71	33.97%
Engineering	215	68	31.63%
Processing	130	42	32.30%
Services	546	149	27.28%
TOTAL	1100	330	30%

for identification and development of the firm's core competence in practice.

- More specifically, we have found that among the four sectors the majority of processing firms (61.90%) fall into the green spectrum, confirming that they have well-developed core competencies, and are engaged in R&D and innovation and activities (See Table 4). Looking at the data, one can see that, only a few engineering (11.76%) and service firms (7.38%) in North – East region fall into the green spectrum of the classification system. Also, as can be seen in Table 4, firms that fall in the green spectrum and yellow spectrums appear to be active in exporting. Specifically, those firms that fall in the green spectrum appear to have a higher intensity of export activities. For instance, of the 12 firms reported having 50% of exports of their sales, all fall into the green spectrum of the classification system, which further points to a clear linkage between a firm's core competence and exporting activities. This finding is supported by the literature (Gourlay, Seaton, & Suppakitjarak, 2005; Love & Mansury, 2009; Ganotakis & Love, 2011 ).
- Furthermore, nearly half of both engineering (50%) and service firms (54.36 %) fall into a red segment which appears to have a low probability of developing a core competence and hence low chance of innovation activities within this classification system. This is evident in their exporting activities. For instance, of the 32 engineering firms in the red segment of the spectrum, all do not have any exporting activities at all. Similarly, of the 131 firms with no exports, 81 fall into the red segment of the classification system.
- It is found that a high number of firms in our sample (79 firms) fall into the orange segment of this classification system. Looking at the data, 29.57% of the manufacturing and 22.81% of service firms fall into this category (although, many have reported positive responses concerning the presence of a core competence). Instead, they appear to have only potential for developing a core competence within our framework.
- These companies are good candidates for using the proposed framework as a strategic management tool to develop a core competence via improving one /more of the aforementioned output characteristics. For example, they can allocate resources specifically to improve their products access to a broader variety of markets via a targeted R&D activity, within the proposed theoretical framework.
- Despite reporting positive responses concerning presence of a core competence), 36.36% of manufacturing firms; 19.06% of processing firms and 19.11% of engineering firms fall into the yellow segment of this classification system, indicating that their respec-

**Table 4**  
Classification of firms.

No of firms	Believed to have core competence	Turnover		R&D		Exports Intensity		Score	
				Yes	No				
42	35	Less than 100000	1	Yes	No	Nil	5	0-4	2
		100000- 1 million	6			10-25%	12	4-6	6
		1 million-5million	11	39	3	25-50%	15	4-8	8
		5 million +	24			50%+	10	8-10	26

**Engineering Industry**

No of firms	Believed to have core competence	Turnover		R&D		Exports Intensity		Score	
				Yes	No				
68	62	Less than 100000	5	Yes	No	Nil	34	0-4	34
		100000- 1 million	12			10-25%	32	4-6	13
		1 million-5million	2	61	7	25-50%	2	6-8	13
		5 million +	49			50%+	0	8-10	8

**Services Industry**

No of firms	Believed to have core competence	Turnover		R&D		Exports Intensity		Score	
				Yes	No				
149	139	Less than 100000	20	Yes	No	Nil	131	0-4	81
		100000- 1 million	52			10-25%	18	4-6	34
		1 million-5million	50	117	32	25-50%	0	6-8	23
		5 million +	27			50%+	0	8-10	11

**Manufacturing firms**

No of firms	Believed to have core competence	Turnover		R&D		Exports Intensity		Score	
				Yes	No				
71	68	Less than 100000	2	Yes	No	Nil	20	0-4	7
		100000- 1 million	10			10-25%	44	4-6	21
		1 million-5million	31	67	4	25-50%	5	6-8	26
		5 million +	28			50%+	2	8-10	17

tive core competencies need to be further developed and refined, for example, through improving access to a broader variety of markets via a targeted R&D activities.

- Based on our sample data, the majority of the companies in this peripheral region appear to fall into either the yellow or the orange segments of the above core-competence spectrum with the vast majority of them (57.6%, 190 firms) do not have access to a wide variety of markets.
- Looking at some broader issues arising from these findings, the data collected (Fig. 6) further exposes the incapability of firms in North- East England to fully develop their core competencies due to various constraints, including finance, size, technological

capabilities, and brain drain. Specifically, nearly half of the firms in this sample (157 firms, 47.57%) considered the lack of financial resources as the key constraint for engaging in sustainable innovation activities. These findings seem consistent with the existing literature confirming the linkage between core competence, output characteristics, innovation, and exporting (Love et al., 2005; Ljingquist, 2008; Bonjour & Micaelli, 2010).

Following on from this specific demonstration, it is evident that the classification system outlined above (Fig. 4 and Table 4) could provide a practical strategic management tool for regional policy-makers for allocating scarce financial resources to help companies

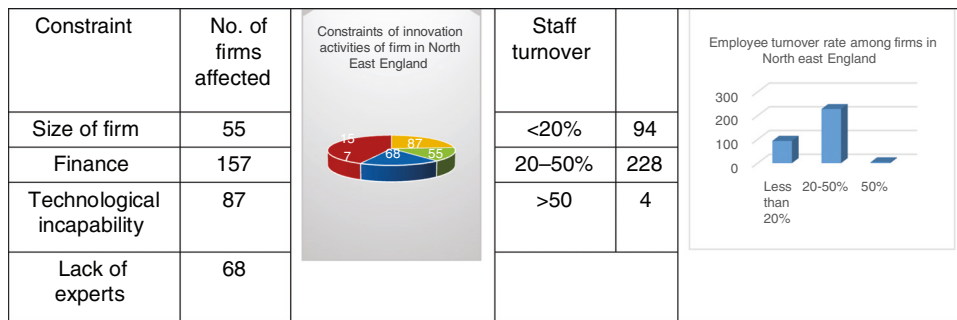


Fig. 6. Constraints of firms in North East England for undertaking R&D and innovation activities.

to develop and refine their core competencies in peripheral regions. In this sense, this practical tool provides a significant contribution in escalating the vague concept of the firm's core competence to an operational-level reality, which could benefit both firms and policymakers.

For firms, the benefits of employing this strategic -tool are twofolds:

- 1 This segmentation exercise could be used as a practical self-assessment tool for firms to generate fresh information on their competency levels and areas to improve. For instance, firms in the green segment, with well-established core competences and a high potential for innovation, could delve into blue ocean strategies (see Kim and Mauborgne, 2005), which are next-level strategies to earn untapped competitive advantage and success. Firms allocated to the orange segment have the potential to have core competences but need serious attention and further focus to develop these via R&D activities to improve key characteristics of their output. Finally, firms in the red segment need critical attention; otherwise, they will be gradually run out of business
- 2 The scoreboard gives firms a clear indication of their core competence status and their grade. Besides, it indicates the direction of the firm's innovation and long-term strategy and competitiveness.

Furthermore, for regional policymakers, this empirical framework offers an indication of the most innovative and competitive firms in their domain. As a result, policymakers could employ this tool to examine the conditions, competency, and exporting levels of firms in their region. Also, the scorecard generated by the suggested theoretical framework could be further utilized to categorize firms by their grade/level of core competence for financial assistance and a clustering exercise to help regional growth.

**A summary and conclusion**

The core competence of a firm and its development over time play a crucial role in a firm's innovation and exporting activities ensuring a firm's survival and sustained growth over time. An initial step in an innovation process is to establish whether a core competence potentially exists in order to further develop and enhance it over time. This study was motivated by the need for a strategic management tool for this purpose. To this end, we developed a framework for establishing whether a firm is likely to have a core competence, given a firm's observable output characteristics. An essential component of this framework is a classification system, which acts as a strategic management tool for innovation and growth at a firm level. Within this theoretical framework, a firm/organization can strategically allocate internal resources to ensure development and refinement of its core competence via improvement and enhancement of key characteristics of its output/products. Furthermore, it is the externally observable char-

acteristics of what a firm produces, rather than its internal functions that establishes whether a core competence potentially exists, in order to operationalize it for R&D and innovation activities. In this regard this study provides an alternative theoretical and empirical framework for operationalization of the concept of a firm's core competence for innovation in practice.

To demonstrate how this framework might be used in practice we applied it to a sample of 330 North East England firms. Via this application, the theoretical framework was shown to perform well, providing an alternative strategic management tool and a classification system for innovation management in practice.

It is evident from our empirical results that companies operating in the North East England, by and large, have not been able to fully develop core competencies that are needed for innovation and exporting activities. Furthermore, they appear to face severe financial and technological constraints preventing them from remedying this situation via a sustained R&D activity. These findings are consistent with the recent reports of NELP, which illuminates the low productivity of this region and lack of an effective innovation system (NELEP, 2018, 2017).

North East region is lagging behind other key regions of the UK in innovation, R&D, and exporting activities and it would thus benefit from the implementation of a targeted regional policy designed to help firms in these activities. This study provides a practical strategic - management tool for firms, as well as, regional policymakers for this purpose.

**Uncited references**

Antonelli (2001), Banerjee (2003), Bowman and Ambrosini (2003), Chen Ming and Chang (2011), [9], Eisenhardt and Santos (2000), Gallon and Stillman (1995), Godbout (2000), Grant (1991), Grant (1996a), Grant (1996b), Gupta et al. (2009), Hamel and Prahalad (1990), Hamel et al. (1989), Hamel (1994), Hamel and Prahalad (1994), Hamel et al. (1994), Jabbouri and Zahari (2014), Kak (2002), Kandampully (2002), Kenneth et al. (2000), King and Zeithaml (2001b), King and Zeithaml (2001a), Kirismarja and Aino (2013), Knoll (2003), Kogut and Zander (1992), Lei et al. (1996), Leonard-Barton (1992), Ljungquist (2008), Malebera (1992), Nonaka and Takeuchi (1995a), Nonaka et al. (2000), Nonaka (1994), Nonaka and Takeuchi (1995b), NELEP (2016a), OECD (2007), OECD (2012), Peteraf and Bergen (2003), Quevedo et al. (2011), Round (2016), Schreyögg and Geiger (2007), Szulanski (1996), Szulanski (2003), Teece et al. (1997), Theriou et al. (2009), Torkkeli and Tuominen (2002), Uygur (2013), Ussahawanitchakit (2007), Uysal (2008), Zahra et al. (2019) and Zúñiga et al. (2010).

**Appendix A. Supplementary data**

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.jik.2019.12.005>.

## References

- Agha, S., Alrubaiee, L., & Jamhour, M. (2012). Effect of core competence on competitive advantage and organisational performance. *International Journal of Business and Management*, 7(1)
- Antonelli, C. (2001). *The Microeconomic of technological systems*. Oxford: Oxford University Press.
- Banerjee, P. (2003). Resource dependence and core competence: Insights from Indian software firms. *Technovation*, 23, 251-263.
- Bogner, W. C., Thomas, H., & McGee, J. (1999). Competence and competitive advantage: Towards a dynamic model. *British Journal of Management*, 10, 275-290.
- Bonjour, E., & Micaelli, J. P. (2010). Design core competence diagnosis: A case from the automotive industry. *IEEE Transactions on Engineering Management*, 57, 2.
- Bowman, C., & Ambrosini, V. (2003). How the resource-based and the dynamic capability views of the firm inform competitive and corporate level strategy. *British Journal of Management*, 14, 289-303.
- Chen Ming, H., & Chang, W. (2011). Core competence: From a strategic human resource management perspective. *African Journal of Business Management*, 5(14), 5738-5745.
- Clark, D. (2000). Implementation issues in core competence strategy making. *Strategic Change*, 9(2), 115-127.
- Conte A and Vivarelli M. (2013). Succeeding in Innovation: Key insights on the Role of R&D and Technological Acquisition Drawn from company Data, IZA DP. No.7671.
- Coombs, R. (1996). *Core competencies and the strategic management of R&D*. pp. 26. R&D Management.
- DeNisi, A., Hitt, M., & Jackson, S. (2009). *The knowledge-based approach to sustainable competitive advantage*.
- Dixon, A. J., & Seddighi, H. R. (1996). An analysis of R&D activities in North East England manufacturing firms: The results of a sample survey. *Regional Studies*, 30(3), 287-294.
- Duke, C., Hassinik, R., Powell, J., & Puukka, J. (2006). Supporting the contribution of higher education Institutions to Regional Development. *OECD*.
- Eisenhardt, K., & Martin, A. J. (2000). Dynamic Capabilities: What are they? *Strategic Management Journal*, 21, 1105-1112.
- Eisenhardt, K., & Santos, F. (2000). *Knowledge-based view: A new theory of strategy? Handbook of strategy and management*. Sage Publications.
- Gallon, M. R., & Stillman, H. M. (1995). Putting core competency thinking into practice. *Research Technology Management*, 38, 20-32.
- Ganotakis, P., & Love, J. H. (2011). *R&D Product innovation, and exporting: Evidence from UK new technology-based firms* JEL classification.
- Godbout, A. J. (2000). Managing core competencies: The impact of knowledge management on human resources practices in leading-edge organizations. *Knowledge and Process Management*, 7, 76-86.
- Gokkaya, O., & Ozbag, G. (2015). Linking core competence, innovation, and firm performance. *Journal of Business Research Turk*, 90-102.
- Gourlay, A., Seaton, J., & Suppakitjarak, J. (2005). The determinants of export behavior in UK service firms. *Service Industries Journal*, 25(7), 879-889.
- Grant, R.M. (1991). The resource based theory of competitive advantage; Implications for strategy formulation. *California Management Review*, 33, 114-135.
- Grant, R. (1996a). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17, 109-122 (Winter).
- Grant, R. (1996b). Prospering in dynamically- competitive environments: Organisational capability as knowledge integration. *Organisational Science*, 7(4), 75-387.
- Gupta, S., Woodside, A., Dubelaar, C., & Bradmore, D. (2009). *Diffusing knowledge-based core competencies for leveraging innovation strategies*.
- Hafeez, K., Zhang, Y., & ve Malak, N. (2002). Core capabilities for sustainable competitive advantage: A structured methodology for identifying core capabilities. *IEEE Transactions on Engineering Management*, 49-1.
- Hafeez, K., & Essmail, E. A. (2007). Evaluating organization core competences and associated personal competences using the analytical hierarchy process. *Management Research News*, 30(8), 530-547.
- Hamel, G., & Prahalad, C. K. (1990). The core competence of the corporation. *Harvard Business Review*, 68(3), 79-92.
- Hamel, G., Doz, Y., & Prahalad, C. K. (1989). *Collaborate with your competitors and win* Harvard Business Review.
- Hamel, G. (1994). "The concept of core competence" in *competence-based competition*. New York: Wiley.
- Hamel, G., & Prahalad, C. K. (1994). *Competing for the future*, harvard business review July-August. pp. 122-128.
- Hamel, G., & Prahalad, C. (1994). The concept of core competence. In G. Hamel, & A Heene (Eds.), *Competence-based competition* (pp. 11-33). New York, NY: Wiley.
- Jabbouri, N., & Zahari, I. (2014). . pp. 1857-7881. . *The role of core competencies on organizational performance: An empirical study in the Iraqi private banking sector* (1).
- Javidan, M. (1998). Core competence: What does it mean in practice? *Long Range Planning*, 31(1), 60-70.
- Kak, A. (2002). Sustainable competitive advantage with core competence, a review. *Global Journal of Flexible Systems Management*, 3(4).
- Kandampully, J. (2002). Innovation as the core competence of a service organization: the role of technology, knowledge, and networks. *European Journal of Innovation Management*, 5(1), 18-26.
- Kenneth, S., Conway, J. L., & Graham, P. L. (2000). Organizational learning: A critical component to new product development. *Journal of Product and Brand Management*, 9(2), 99-119.
- King, A. W., & Zeithaml, C. P. (2001b). Competences and firm performance: Examining the causal ambiguity paradox. *Strategic Management Journal*, 22, 75-99.
- King, A. W., & Zeithaml, C. P. (2001a). Competencies and firm performance: Examining the causal ambiguity paradox. *Strategic Management Journal*, 22, 75-99.
- Kirismarja, B., & Aino, K. (2013). *A knowledge-based view of the firm-theoretical notions and implications of Management*.
- Knoll, N. (2003). Business R&D and the role of Public policies for Innovation support: A qualitative approach. *Technology Information Policy Consulting*.
- Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organisation Science*, 3, 383-397.
- Lei, D., Hitt, M., & Bettis, R. (1996). Dynamic core competences through meta-learning and strategic context. *Journal of Management*, 22(4), 549-569.
- Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, 13, 111-125 (Special issue).
- Ljungquist, U. (2008). Specification of core competence and associated components: A proposed model and a case illustration. *European Business Review*, 20(1), 73-90.
- Ljungquist, U. (2007). *Core competence matters: Preparing for a new agenda*. Sweden: Växjö University.
- Love, J. H., & Mansury, MA. (2009). Exporting and productivity in business services: Evidence from the United States. *International Business Review*, forthcoming.
- Malebera, F. (1992). Learning by firms and incremental technical change. *The Economic Journal*, 102(413), 845-859.
- Mascarenhas, B., Baveja, A., & Jamil, M. (1998). Dynamics of core competencies in leading multinational companies. *California Management Review*, 40, 117-132.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company*. New York: Oxford University Press.
- Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, Ba, and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*, 33(1), 5-34.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organisational Science*, 5, 14-37.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company*. Oxford, England: Oxford University Press.
- North East Local Enterprise Partnership. (2016b). *The north east LEP area, European structural, and investment plan*. pp. 2014-2020.
- North East Local Enterprise Partnership. (2016a). *The north east strategic economic plan, evidence base*.
- OECD. (2007). *R&D and innovation in Spain: Improving the policy mix*.
- OECD. (2012). *Growth path in the 20th century, employment and growth in knowledge-based accounting*. Paris, France: OECD.
- Özbağ, G. (2013). Resource based view, core competence and innovation. *A Research on Turkish Manufacturing Industry Scientific Research Journal (SCIRJ)*, I(III), October 2013 Edition, ISSN 2201-2796.
- Peteraf, M. A., & Bergen, M. E. (2003). Scanning dynamic competitive landscapes: A market-based and resource-based framework. *Strategic Management Journal*, 24(10), 1027-1041.
- Petts, N. (1997). Building growth on core competencies - A practical approach. *Long Range Planning*.
- Quelin, B. (2000). Core competencies, R&D management and partnerships. *European Management Journal*, 18, 476-487.
- Quevedo, J., Pellegrino, G., & Vivarelli, M. (2011). *R&D drivers in young innovative companies* IZA DP.No.6136.
- Round, A. (2016). *At the cross roads: Regional trade in North East England*. IIPR.
- Sanchez, & Heene, A. (1997). Reinventing strategic management: New theory and practice for the competence-based competition. *Eur. Manage. J.*, 15(3), 303-317.
- Schreyögg, G., & Geiger, D. (2007). The significance of distinctiveness: A proposal for rethinking organizational knowledge. *The organization*, 14(1), 77-100.
- Seddighi, H. R. & Huntley, P. J. (2007). R&D activities in a peripheral region: An empirical study with special reference to the North East Region of the UK. *Economics of Innovation and New Technology*, 6, 211-225.
- Seddighi, H. R. (2015). A model of firm's growth in a knowledge-based economy. *Journal of the Knowledge Economy*, 6(2), 215-227.
- Sisman, F., Gemlik, N., & Yozgat, U. (2012). The assessment of viewpoint of core competence understanding of successful companies in developing countries: The case study of Turkey. *International Journal of Research in Business and Social Science*, 3(6).
- Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of the best practice within the firm. *Strategic Management Journal*, 17, 27-43, winter Special Issue.
- Szulanski, G. (2003). *Sticky knowledge- barriers to knowing in the firm*. London: Sage Publications Ltd.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18, 509-533.
- Theriou, G. N., Aggelidis, V., & Theriou, N. G. (2009). A theoretical framework is contrasting the resource based perspective and the knowledge-based view. *European Research studies*, 12(3).
- Torkkeli, M., & Tuominen, M. (2002). The contribution of technology selection to core competencies. *International Journal of Production Economics*, 77, 271-284.



- 616 Uygur, U. (2013). *Determinants of causal ambiguity and difficulty of knowledge*  
617 *transfer within the firm* Retrieved from Loyola e Commons, School of Business:  
618 Faculty Publications and Other Works, Paper 3. 629
- 619 Ussahawanitchakit, P. (2007). Linking Entrepreneurial Orientation to  
620 Competitiveness: How do Thai SMEs Make It Works Successfully? *International*  
621 *Journal of Business Strategy*. 630
- 622 Uysal, G. (2008). *Core compétence: A compétitive base for organisational success*.  
623 Turkey: Hacettepe University. 631
- 624 Yang, B.-C., Wu, B.-E., Shu, P.-G., & Yang, M.-H. (2006). On establishing the core  
625 competency identifying model: A value-activity and process-oriented  
626 approach. *Industrial Management & Data Systems*, 106(1), 60–80. 632
- 627 Zahra, S. A, Sapienza, H. J, & Davidson, P. (2006). Entrepreneurship and dynamic  
628 capabilities: A review, model and research agenda. *Journal of Management*  
633 *Studies*, 43, 917–955. 634
- Zúñiga, H, Veenstra, A., Vraga, E., & Shah, D. (2010). Digital democracy:  
635 Reimagining pathways to political participation. *Journal of Information*  
636 *Technology & Politics*, 7(1), 36–51. 637
- Zoiopoulos, II, Morris, PWG, & Smyth, HJ. (2008). *Identifying organizational*  
638 *competencies in project-oriented companies: An evolutionary approach the*  
639 *Bartlett School of Construction and Project Management*. London: University  
640 College London, 1-19 Torrington Place Site. WC1E6BT. 641
- Zollo, M, & Winter, S. G. (2002). Deliberate Learning and the Evolution of Dynamic  
642 Capa Hitchcock C, 2006, Conceptual analysis naturalized: A methodological  
643 study. *The Journal of Philosophy*, 103, 427–445. 644