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AUTHORS: **Samantha Marie Burvill, Dylan Jones-Evans and Hefin Rowlands**

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Q12	Please provide the name of the publisher in references: Davidsson and Wiklund (2000), Ward and Rhodes (2014)



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Reconceptualising the principles of Penrose's (1959) theory and the resource based view of the firm

The generation of a new conceptual framework

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Abstract

Purpose – The purpose of this paper is to develop a conceptual framework to explain the firm growth process based on an integration and extension, through empirical research, of Penrose's theory of the growth of the firm and the resource-based view. Theoretical development within the firm growth literature has been noticeably limited. Firm growth studies use different theoretical bases and what is needed is integration of multiple theories and empirical testing of these to form a new conceptual framework capable of explaining the modern growth process fully.

Design/methodology/approach – The key perspectives are critically reviewed and integrated and empirical qualitative research is undertaken analysing the process of growth in two firms. Semi-structured interviews, participant observation and analysis of company documentation are utilised.

Findings – The key insight this research provides is detailed information with regard to which resources, mediators and outputs are vital to firm growth, how they need to be developed and why this is the case. The study shows that these act in a cyclical nature to enable firm growth and development.

Practical implications – These findings could be used by practitioners to determine which part of the conceptual framework requires the most amount of improvement and which are developed to an acceptable state, enabling them to make plans for the achievement of growth.

Originality/value – This research is able to reconceptualise two dominant theoretical perspectives resulting in the generation of a new firm growth framework, thereby addressing a distinct gap in the firm growth literature.

Keywords Penrose, RBV, Framework, Growth theory

Paper type Research paper

Introduction

It is generally accepted that small firms that grow contribute greatly to the economy (Acs, 2006; Autio, 2007, 2012; Morris, 2011; Ward and Rhodes, 2014), and the greatest contributors are high growth small firms (Autio, 2005; Bravo-Biosca and Westlake, 2009; Anyadike-Danes *et al.*, 2013; Octopus report, 2015). This coupled with the fact that it has also been found that their impact on employment holds true under times of economic recession (Coad, 2009), means that focus into high growth small- to medium-sized enterprises (SMEs) by academic and policy makers has grown. However, despite this vast increase in research there has been a distinct lack of growth theory development, evidenced by the fact that the most popular and in-depth growth theory was developed over 50 years ago by Edith Penrose (1959). Since this time, development of firm growth theory has been limited, due to the complexity of the growth process itself. Add to this, the failure to adhere to similar methodological approaches and operational definitions and the result is a lack of theoretical development (Delmar *et al.*, 2003) and an increase in fragmented theoretical application (McKelvie and Wiklund, 2010; Leitch *et al.*, 2010).



As a result, it has been suggested by Davidsson and Wiklund (2000) and Almarri and Gardiner (2014) that the study of firm growth requires consideration of a number of different theoretical perspectives in order to understand the growth process fully. Key theoretical perspectives include the theory of the growth of the firm (Penrose, 1959) and the resource-based view (RBV) (Wernerfelt, 1984). Coupled with a lack of theoretical development and cohesion, there is also a lack of empirical testing of many theoretical perspectives within the literature. For instance, Lockett *et al.* (2007) argues that there has been little empirical testing of Penrose's concepts, which may be considered surprising given the influence it has had on current academic literature. There are also many issues and knowledge gaps that have been highlighted with the RBV that requires further research (Priem and Butler, 2001; Newbert, 2007; Baker and Ahmad, 2010; Park, 2010). Thus, this research aims to address the identified gaps in the literature to create an integrated conceptual framework, generated through empirical research that incorporates new concepts whilst developing and testing existing theories. Through this the theories will be reconceptualised in a way in which they can be better used by practitioners, making the theoretical practical and able to be widely disseminated.

This research stems from previous PhD research (Yandle, 2014) and builds on the growth platform model that was developed that highlights the key factors required in order to achieve firm growth, their process of development and the sweet spot to which they need to be developed to in order for growth to occur. This paper presents the conceptual framework for this model. The paper begins with an analysis of key firm growth theories with an aim to assessing their limitations and ways in which they can be combined. The case study methodology is then reviewed, where it is accepted that the reliance on two case studies has its limitations. The analysis presents a new conceptual framework and centres on the interactions between the key factors found to be vital to the growth process in the growth platform model (Yandle, 2014). The paper ends by comparing this framework with extant theories and the major contributions of the paper are then analysed. This paper uses the OECD (2007) definition of a high growth firm whereby all enterprises with average annualised growth greater than 20 per cent per annum, over a three-year period, are considered high growth. Growth can be measured by the number of employees or by turnover.

SME growth literature

It is generally accepted that small firms which do grow contribute greatly to the economy (Acs, 2006; Autio, 2007, 2012), and the greatest contributors are high growth small firms (Autio, 2005; Anyadike-Danes *et al.*, 2013). Holzland and Friesenbichler (2007) and Allman *et al.* (2011) argue that even though high growth firms play an essential role in economic development and employment, knowledge about them is extremely limited while Roper and Hart (2013, p. 11) argue that "growth remains something of an enigma". Barringer *et al.* (2005) suggest that gaining knowledge on the attributes of high growth firms will greatly inform our knowledge of the attributes of normal growth firms. Ultimately despite the recognised value of extant research, there remains a considerable knowledge gap as to the process by which SMEs achieve growth and how policy makers and government bodies can support this (Bennett, 2008, 2012; Lee *et al.*, 2016). In an attempt to overcome this, Yandle (2014) created the growth platform model detailing 15 factors critical to the achievement of firm growth, their development over time and to what level they need to be developed to in order for growth to occur. This built upon Klofstens (2010) business platform model but for the start up to growth phase of development. The current research builds upon the growth platform model (Yandle, 2014) attempting to develop a theoretical framework to sit alongside it. This theoretical framework needs not only to be grounded in existing theories but also to merge and

extend them. Forson *et al.* (2014) argue that a conceptual framework is required that is able to bring together the various silos of work that have taken place in the field of small business. As such, a review is now undertaken of the most dominant theoretical perspectives in the firm growth literature.

Theoretical perspectives on firm growth

The theory of the growth of the firm (Penrose, 1959)

By far, one of the most influential theories of firm growth is Penrose's (1959) "The Theory of the Growth of the Firm", in which many ideas are presented that are centred on the processes of firm growth (Mahoney, 2005). Penrose's theory has been focussed upon due to the large number of academic papers published which cite Penrose's work (Rugman and Verbeke, 2004; Lockett *et al.*, 2007; Foss *et al.*, 2008; McKelvie and Wiklund, 2010; Nason *et al.*, 2012) and due to the influence it has had on current academic thought resulting in, for example, the development of the RBV of the firm (Wernerfelt, 1984). Penrose argues that the firm is a bundle of productive resources that can be combined in different ways to create different goods for sale, and this combination of resources is what makes the firm unique. The firm creates a learning environment for all those involved, which leads to new resources that can be used for further expansion, with material resources being of great importance. Penrose believes that internal limits on expansion include unused resources, lack of managerial familiarity and lack of specialised knowledge. Penrose (1959) views firm development as an ongoing process, "in which an interacting series of internal changes leads to increases in size accompanied by changes in the characteristics of the growing object" (p. 1). Interestingly, however, there is a lack of research that specifically looks at this developmental process and instead research has grown into the individual internal determinants of firm growth (Dobbs and Hamilton, 2007), meaning that her concepts have received little direct empirical testing.

However, even though Penrose's theory has been instrumental in the business growth literature, it could be argued that there are concepts that are not emphasised enough in her work, such as the importance of intra-firm relations (Durst and Edvardsson, 2012), open innovation (Chesbrough, 2003; Curley, 2013; Salmelin, 2015), networking (OECD Innovation Strategy, 2010; Furlan *et al.*, 2014) and hybrid modes of growth. Nason *et al.* (2012) for instance found that many of Penrose's principles were evident in empirical research but concluded that the theory required updating due to the emergence of the knowledge-based economy and the new concepts generated in line with this. A clear issue that must also be considered is that Penrose's research focussed upon industrial firms and yet there are now more service-based firms within the economy (Office for National Statistics, 2017), meaning that intangible resources may need more consideration. The way in which certain factors influence growth has also changed dramatically with companies now marketing through social networking (Stelzner, 2016) and developing new products through open innovation (Glassman and Walton, 2010). Thus, this research will attempt to consider firm growth in light of these developments. Penrose's theory was also based upon large firms and as such this research will provide valuable knowledge as to the applicability of Penrose's concepts to SMEs. Penrose (1996) herself notes that the applicability of her theory to modern economic society can be questioned. This research will demonstrate the link between Penrose's widely cited theory and more recent perspectives, in order to create a framework more suited to the realities of firms in today's society, as has been suggested by McKelvie and Wiklund (2010). There has also been little empirical testing of Penrose's ideas (Lockett *et al.*, 2007) and, as a result, this research will add to the literature on Penrose's theory by incorporating many of her ideas into empirical research, thus confirming, contradicting or extending them.

Q1

Q2

RBV of the firm

Q3 The RBV builds on, and was inspired by, the work of Penrose (1959) and takes the perspective that the firm should be considered both as a bundle of products as well as a bundle of resources (Wernerfelt, 1984). It is one of the most dominant theoretical views in the strategic management literature (Kraaijenbrink *et al.*, 2010; Lockett and Wild, 2014; Ferreira *et al.*, 2015) and Barney *et al.* (2011) argue that after 30 years of development the RBV can now be considered a theory. From the forthcoming literature review, it appears that the most commonly agreed upon definition of a resource is that it is something that can provide a firm with either strengths or weaknesses dependant on how it is used. The RBV argues that resources are a source of competitive advantage and that they account for inter-firm performance differences (Hoopes *et al.*, 2003). Barney and Arikan (2001) define these resources as tangible and intangible assets which are used by the firm to create and implement strategies, while Wernerfelt (1984) defines them as anything which can provide the firm with a strength or weakness.

Q4 The main assumptions of the RBV are that competing firms have different resources, that these resource differences are sustainable (Barney and Arikan, 2001) and that the main focus is on what the firm can do with these resources (Davidsson and Wiklund, 2006). Barney and Arikan (2001) argue that in order to be a source of competitive advantage the resource should be valuable, it should be hard for other firms to imitate it and there should be no other resource which can substitute it. However, more recently, it has been argued that resources do not necessarily need to be rare but rather can be quite ordinary and yet still provide a firm with competitive advantage (Warnier *et al.*, 2013; Frery *et al.*, 2015). This research will provide insight into this claim.

Barney and Arikan (2001) suggest different types of resources that a firm may have, including tangible resources such as finance and physical capital and intangible resources such as human capital and relationships. Intangible resources are vital to many knowledge-based firms and due to the rise of the knowledge-based economy are central to the way in which they achieve and sustain growth (Riley and Robinson, 2011; Dal Borgo *et al.*, 2012; Salmelin, 2013). Even though these intangible resources are of vital importance, they may be more difficult to research as they are less defined (Chrisman *et al.*, 1998; Levitas and Chi, 2002). This research will investigate some of these issues and concentrate on the key tangible and intangible resources necessary for firm growth, thus further developing knowledge as to the applicability of the RBV to SMEs.

However, as Baker and Ahmad (2010) argue, it is not always easy to find a resource which fits all of the criteria set out by Barney and Arikan (2001). Park (2010) also argues that the RBV does not explain in enough depth how certain intangible resources provide the firm with competitive advantage. Barney and Arikan (2001) argue that it is not always the case that a firm with valuable resources will gain superior performance, as valuable resources are not the only variables needed for a firm to grow, suggesting that a complete theory of firm growth requires a consideration of resources as well as other factors. The RBV literature also alludes to the importance of the combination of different resources through resource bundles that are heterogeneous across firms (Wernerfelt, 1984; Barney and Arikan, 2001; Peteraf *et al.*, 2003), but what is less clear is which specific resources need to be combined and in what way, in order to influence firm growth.

Q5 According to Barney and Arikan (2001), empirical research conducted into the RBV has in the main supported it. Newbert (2007), however, argues that the methodology used to reach this conclusion was flawed and in their assessment of the literature find that only half of the tests were empirically supported. Newbert (2008) concludes that there is little direct empirical evidence for the RBV and that its acceptance is based upon its logic. However, Wiklund *et al.* (2009) argue that the RBV is important to consider when studying firm growth, while Peteraf and Barney (2003) suggest that both its strength and weakness are that it attributes firm

performance differences to internal firm variables. However, the transaction cost economics perspective argues that resources can be utilised externally to the organisations benefit (Tece, 1980), while Dyer and Singh (1998) argue that resources can span firm boundaries and be acquired from other firms, therefore suggesting that resources can also be bought in from other organisations. More recently, Yim *et al.* (2015) find that inter-firm relationships and relational strategies improve a firm's competitive position.

Rugman and Verbeke (2002) argue that although there has been a large amount of research conducted based on the RBV, its definitions are still vague with no agreement as to what exactly a resource is. It has also been argued that the RBV does not explain how resources add to a firm's competitive advantage, meaning that it is vague and tautological (Priem and Butler, 2001). Arend and Levesque (2010) argue that future research needs to identify the exact resources that are crucial for organisations to prosper and analyse their process of development over time in order to identify how to develop them to their full value. Lockett and Wild (2014) also agree with this need for process-based research in the RBV literature and also argue that research exploring the RBV has tended to neglect the use of case studies, which is surprising given that it stems from Penrose's (1959) case study research. Salazar (2017) argues that it is important to analyse the interrelations between resources instead of looking at resources in a singular way. Almarri and Gardiner (2014) argue that the RBV needs to be integrated with other theories to overcome the shortcomings associated with it and that case study research may be the best way to achieve this. This research aims to add insight into each of these issues by identifying exactly which key resources are required for high growth and analysing their process of development through case study-based research. The research will use principles from the RBV of the firm as well as Penrose's principles and by considering more than one perspective, a more holistic framework will be created.

Dynamic capabilities view

The dynamic capabilities perspective overcomes some of the issues of the RBV by proposing that capabilities enable the integration and use of resources to the organisations benefit (Tece *et al.*, 1997), with Wu (2007) arguing that they act as mediators between resources and performance and Carrick (2016) arguing that they enable the development of further resources. Kabue and Kilika (2016) argue that firms must turn ordinary resources into rare processes that are hard to imitate, therefore also suggesting that there is a step between resources and firm success that must be considered. Eisenhardt and Martin (2000) argue that dynamic capabilities can be made up of things such as product development and strategic decision making. However, the dynamic capabilities perspective is accused of being vague very much like the RBV (Priem and Butler, 2001; Burisch and Wohlgemuth, 2016) and this is something that this research will overcome by identifying exactly what dynamic capabilities small firms require.

Summary and theory integration

The theories analysed cannot act alone to explain the complex phenomenon of firm growth. They provide a base from which to integrate much of the extant literature on firm growth, and yet a more specific and coherent framework needs to be created which combines their key principles with new concepts and perspectives that are relevant in the modern economic era and which is based on empirical research.

Focussing first on the RBV, this is extremely useful as a practical tool to aid managers in understanding their capabilities and as such the RBV is often targeted at journals with managerial audiences. Hansen *et al.* (2004), however, argue that its theoretical use in explaining firm growth is less pronounced and that to overcome this it should be combined with Penrose's framework. Hoopes *et al.* (2003) also argue that the RBV should be considered as part of a larger theory and not singularly. Ultimately, Armstrong and Shimizu (2007) argue

that the RBV needs to be refined theoretically and undergo empirical development, something which this research will aim to explore. Autere (2005) argues that this multi-theoretical approach is important as the RBV cannot, on its own, fully explain firm growth.

With regard to the combination of the RBV and Penrose's theory, this is naturally engendered as the former stems from the latter. Both the RBV and Penrose place, an emphasis on resources (Penrose, 1959; Wernerfelt, 1984) and an analysis of both perspectives highlight that the resources they focus upon are often the same, for instance consisting of management, products, knowledge and finance. Both argue that resources are distributed heterogeneously amongst firms (Penrose, 1959; Hoopes *et al.*, 2003) and that resources can be used differently to create different products and services. Importantly, they both recognise that resources are not by themselves sufficient to enable firm growth; however, this has only recently been acknowledged in the RBV through the dynamic capabilities perspective (Teece *et al.*, 1997). Even though the RBV focusses on explaining strategic advantage (Ferreira and Azevedo, 2007), while Penrose (1959) focusses on explaining growth, they both purport that it is important that resources are unique to the firm and that management should deploy resources while developing new ones (Penrose, 1959; Grant, 1996). The dynamic capabilities perspective stems from the RBV, suggesting that it is well suited to be included in this theoretical combination. However, the main disadvantage of all of these perspectives and one of the reasons why a combination is engendered is due to none being specific enough to be able to aid practitioners, policy makers and academics in enabling firm growth. Both Penrose's theory and the RBV also traditionally focus upon the internal workings of firms only and neglect more abstract internal and external factors such as relationships and motivations meaning it is essential that they are both combined with intangible and external concepts (Barney and Arikan, 2001; Peteraf and Barney, 2003; Nason *et al.*, 2012). The differences between the two theories actually mean that it makes more theoretical sense to combine them. For instance, Penrose's theory is descriptive, explanatory and process based, whereas at times the RBV is descriptive only and is very static (Arend and Levesque, 2010). Their combination means that the disadvantages associated with the RBV could be overcome. Importantly, the RBV focusses on human capital as well as on management and entrepreneurs, whereas Penrose focusses only on the latter. As such, this focus on human capital could bring Penrose's theory into the twenty-first century, characterised by the importance of small non-managerial human capital teams. By bringing the basic principles of these theories into the twenty-first century, testing them and combining them into one integrated whole, a holistic and dynamic firm growth framework should result. It is also important to combine both Penrose's theory and the RBV with the dynamic capabilities perspective (Teece *et al.*, 1997) as this provides a good base with which to explore how resources are used to enable firm growth.

In summary, Penrose's theory appears to be relevant in the modern economic society, in which we live but does require integration with other newer theories and concepts in order to fully explain the modern firm growth phenomenon. Penrose's theory is the most holistic and has many similarities with the RBV. Each theory when compared has slight differences or disadvantages that could be overcome by their integration. It is concluded that the theoretical integration of Penrose's theory, the RBV and the dynamic capabilities perspective, as well as their extension through the consideration of more recent concepts, is the best and most appropriate way, in which to create a new framework that is both descriptive and explanatory.

Methodology

This paper utilises a data set generated during PhD research and builds upon the growth platform model generated from this (Yandle, 2014). The methods used to generate the model

upon which this research builds and to generate the accompanying framework will now be presented. As the aim of this research was to explore theory then a methodological approach fitting of this purpose was required. Eisenhardt (1989) advocates case studies for theory building in areas, where existing theory appears to be inadequate. Due to the need for theory development, it was decided that a multiple case approach (Glaser and Strauss, 1967) would be most fitting. The data were generated through a process of semi-structured interviewing, participant observation (at one case company) and analysis of company documentation.

Theoretical sampling of multiple cases was undertaken, in order to compare and contrast each firm's developmental progress. Two case studies were chosen, one that had already achieved high growth and one that was at an early stage of development on the path to high growth (at which one of the authors worked full time). The high growth firm was chosen from the Fast Growth 50 awards list and ensured that an independent party will have recognised the company as having achieved high growth, a methodology commonly used (Langrish *et al.*, 1972; Oakey *et al.*, 1980; Smith and Miner, 1984; Crick *et al.*, 2002). The early stage firm was chosen as they were also a knowledge-based firm who were aiming for high growth. The firm selection criterion was based upon size differences, with a view to highlighting firm development from organisations at different stages of their development. It was determined that the firms were at different stages of development using the OECD (2007) definition of a high growth firm combined with the Fast Growth 50's definition. Studying two firms at different stages of development would provide a wider knowledge of firm growth processes than would be discovered through an analysis of two high growth firms. Although the two firms operated in different sectors they were both high technology, knowledge-based companies offering both service and product offerings. This case selection allowed the greatest amount of in-depth knowledge gain and generalisability possible. All employees were interviewed at the host case, while directors, the executive management team and one employee were interviewed from the high growth case. This was purposely done in order to gain in-depth information as to the firms' development from multiple sources (Yin, 2009). The interviews were based around key themes which would be relevant to any business and the questions were worded in order to ascertain how these themes had developed over time within the firm, with 25 interviews taking place each lasting between one and two hours. Participant observations took place over a period of 18 months at the host company and over 50 company documents were analysed. The key themes were generated from the review of the firm growth literature that was conducted in conjunction with participant observations at case A. Factors were chosen for inclusion, if it was suggested that they were critical to firm growth. It is accepted that the reliance on only two case studies is one of the biggest limitations of this study. However, Penrose's (1959) research which is widely cited focusses on only a small number of case studies in order to provide in-depth analysis. Davidsson *et al.* (2007) argue that concentrating on a specific and small subset of firms is advantageous as otherwise the relationships found between factors may remain undetected. The results are presented as exploratory and preliminary, providing a clear grounding for further confirmatory research to take place.

Data analysis

All interviews were transcribed and then all interviews, observations and company documentation were subjected to open coding, axial coding and hierarchical coding (Strauss, 1987). In total, 15 hierarchical categories emerged to explain the firm growth process and comparative analysis was then undertaken based around these 15 categories in order to ascertain if there were similarities or differences. Framework development occurred along the lines of developing a core category as is suggested by Strauss and Corbin (1998), through theoretical coding. This was enabled through the comparison of all the higher level codes. Three core categories were identified and although Strauss and Corbin advocate only one core category, this research involves so many variables that in order to explain the

connection between them three was deemed necessary. For the purposes of this research, only the influences of each factor were analysed in order to ascertain how each combine in order to enable firm growth. Figure 1 summarises the data collection and analysis process.

Case descriptions

Case A is a high-technology optoelectronics company with a focus on laser and LED products that was founded in 2007 by the chief executive officer (CEO) and chief technical officer. The company's main offerings centre on light emitting diode multiplexing technology whereby the company offers bespoke design and manufacture of products specifically to customer requirements. The company is a research and design company that works with a number of business-to-business customers who act as their route to market, and the main markets in which this company operates are that of life sciences and digital display. The company currently employs nine people and has not, as yet, made any substantial sales revenue, due to the fact that there is a lag between the development of customer products and their commercialisation.

Case B was founded in 1997 by one director and since that time has grown considerably to a £10 M turnover. The firm specialises in the temperature controlled pharmaceutical services sector and offers a variety of services including clinical supplies, temperature controlled storage, global logistics, qualified person (QP) and good manufacturing practice consultancy, advanced therapeutic medicinal products and commercial services. In 2008, a new CEO was appointed and a management buyout took place. The firm has grown from employing one staff member to its current total of 60 staff in various departments. Table I summarises the firms and their activities.

Empirical results: growth platform framework

It was found that the multitude of factors identified in the growth platform model (Yandle, 2014), detailed in the literature review, can be split into three themes which highlight how their overall interaction with each other results in firm growth. These three themes or core categories are resources, mediating factors and outputs and this section will summarise each theme in turn. These core categories were developed, as is advocated for grounded theory research (Glaser and Strauss, 1987), through the coding process. It was the coding process and comparative analysis between the two firms that enabled the emergence of the core categories and an understanding to develop of how they link to enable firm growth.

Crucial definitions:

- Resources are defined as factors which enable the firm to initially function, without which the business would not be able to develop.
- Mediators are defined as factors which enable the management of resources and outputs and which enable the transfer of resources to outputs.
- Outputs are defined as factors which are saleable and ultimately bring in revenue for the firm.

Resources

In both cases, there were a certain number of factors that it was essential the firm achieved an inflow of. These enabled a foundation to be formed for growth to be able to develop from. They are essentially the building blocks of the firm, from which all else develops, and which enable the firm to begin its development from a start-up position. In both cases, the resources which were identified were the same and consisted of: aspirations, finance, human capital, management, expertise, contacts, open innovation, customers and software. These factors were identified in both cases as being resources due to the fact that each one was used by the firm to strengthen it, to aid in its development and to enable more resources to be brought on board.

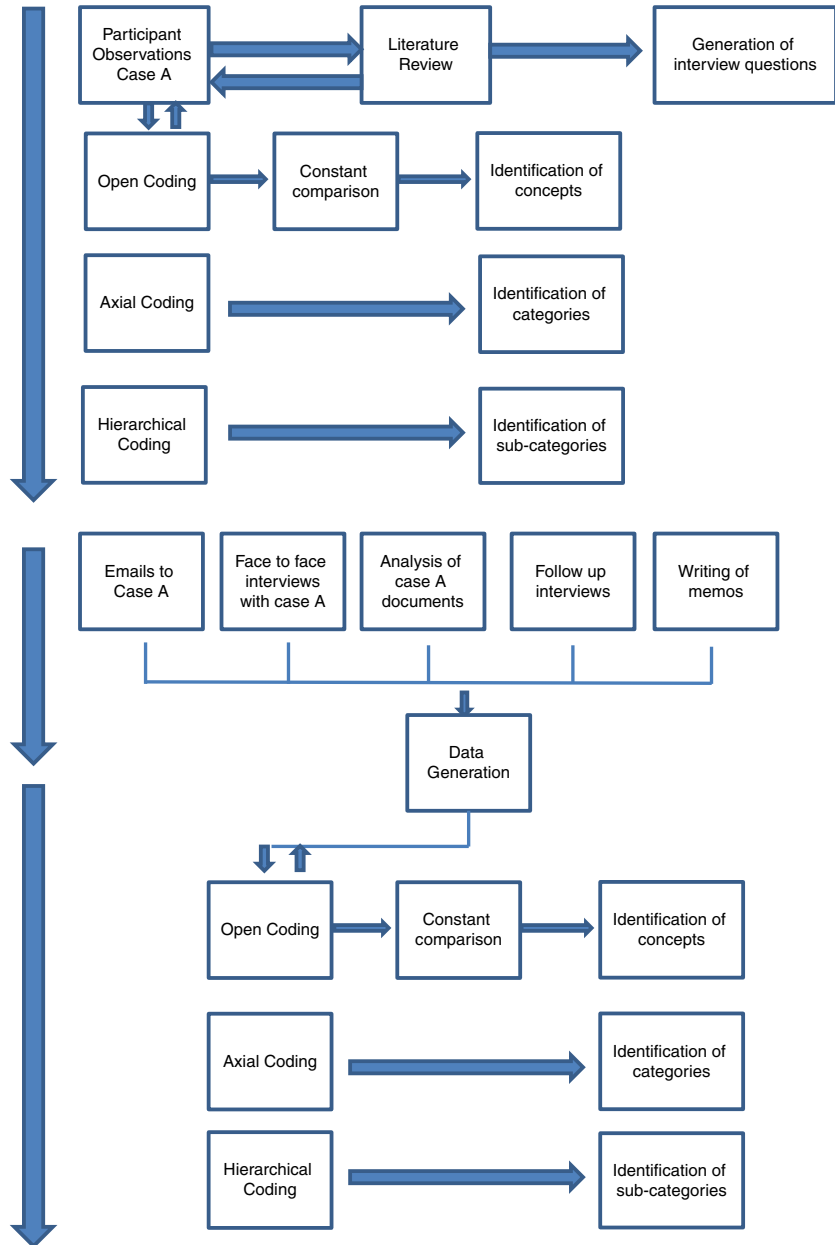
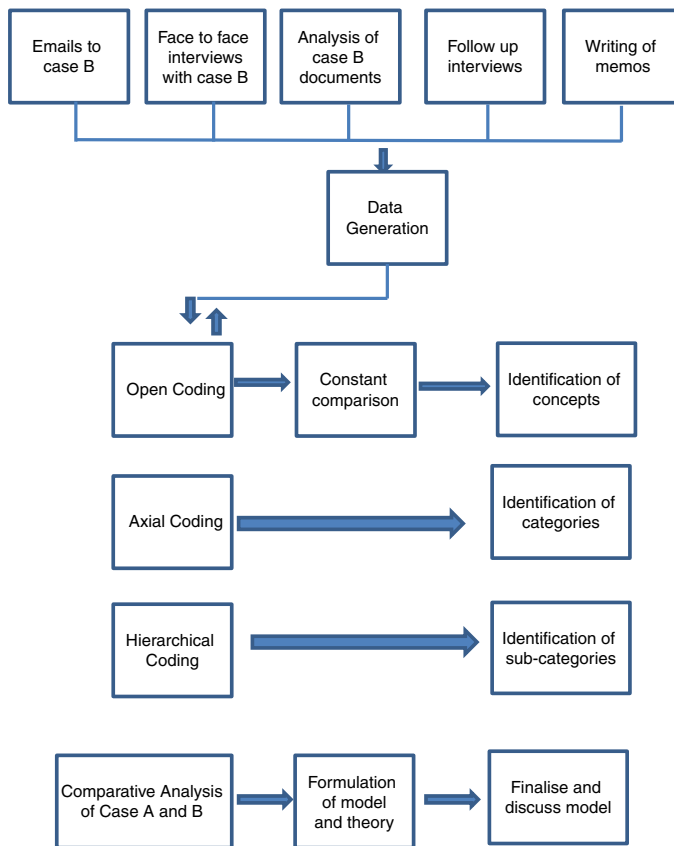


Figure 1.
The methodological process

(continued)



Source: Adapted from Burden and Roodt (2007)

Figure 1.

These factors enable the firm to function and the firm would not be able to develop without them. Aspirations led to the creation of plans, led to staff synergy and when communicated to finance providers aided in the gaining of finance. The owners existing expertise was used by both firms to gain customers, develop processes, utilise existing contacts and to develop products and services. With regard to management, the early employees managed the firm in both cases enabling delegation and planning and aiding in the day-to-day running of the firm by managing each aspect of the firm that aligned with their speciality. Case B then developed beyond this and their management team enabled the creation of departments and the development of quality, processes and business development. After case B had achieved growth the management developed further, with a second-tier management team being appointed to allow for directors to concentrate on strategic issues. When examining human capital, it was discovered that close staff relationships were crucial as they enabled team work and knowledge sharing which aided product, service and customer development.

Regarding the analysis of firm contacts, it was found that both firms utilised existing contacts to gain their first customer, initial staff members and new contacts and used contacts in a bootstrapping capacity. Finance was another key resource for both organisations used for capital equipment, premises and human capital. Case B's revenue increased quickly meaning that they were able to bring in resources such as human capital quite easily, whereas case A's

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	Case A	Case B
Start-up date	2007	1997
Size (small-medium)	Small	Small
Year the first main commercialised product/service is offered into the marketplace	Ongoing	1997
Number of employees (2012)	9	60
Type of activity	Optoelectronics R&D	Pharmaceutical Services
Turnover	£20,200 – (2008) £27,942 – (2009) £65,464 – (2010) £118,248 – (2011) £104,443 – (2012) £194,855 – (2013) £353,643 – (2014)	£800,000 – (2005) £1.1 m – (2006) £1.5 m – (2007) £3.3 m – (2008) £3.6 m – (2009) £7.5 m – (2010) £9.2 m – (2011) £10 m – (2012)
Geographic focus	Worldwide	Worldwide
Management hierarchy	Board (directors) – staff	Board (directors) – executive management team – senior management team – staff
Main funding source	Equity funding (Finance Wales), loans, grants and customer NRE payments	Internal revenue. Additional finance from Finance Wales loans and private investment
Office location	One office in a technology park	Two purpose built split facility buildings
Key director level changes	None	Management buyout in 2008
Number of customers	6	In the hundreds
Number of products/services	One prototype product bespoke designed for each customer through six services	6

Table I.
Case descriptions

lack of finance reduced the resources at their disposal and stunted growth. In both cases, grant money was utilised for marketing, although the majority of case A's grants were utilised for product development, software and capital costs, whereas case B was able to fund its service development and capital costs mainly through internal revenue.

Customers were a crucial resource as they enabled finance to be brought into the organisation. Good relationships with customers were shown in both these firms to enhance product and service development. The main difference was that case A's customers provided finance for development work, whereas case B's customers provided a healthy revenue. Open innovation closely linked with customers and was analysed as a resource due to the additional resources it enabled. Open innovation led to skill and knowledge development and in case A led to capital equipment share, market and technical knowledge and contacts. In case B, open innovation led to internal service development. Software was a crucial resource aiding customer development for case B and open innovation development for case A. The resources and sample case study data highlighting their impact on the firm are shown in Table II. The resources identified, their process of development and the level to which they need to be developed to for growth to occur are shown in Table III.

The resources analysed each serve a key purpose in taking the firm forward from its start-up position. The resources are the first building blocks to the firm's development and the firm could not function without them. For instance, without finance there would be no staff, while without staff there would be no product/service development. These resources cover people, both internal and external, technology and products and strategic level factors.

Resources	Case A	Case B
Aspirations	"When you talk to them it seems like they are looking at exponential growth. They see us going to the stars" (Participant C)	"When I joined I thought a 3-5 year timeline for X to get to a £10 m turnover" (Participant C)
Finance	"We've had grants for jigs and fixtures, capital equipment, for prototype manufacture, to assist in the cost of patents and to assist in the cost of providing a very intense financial forecast" (Participant A)	"Both of those grants revolved around recruiting people so I think that one was 11 people, this one was about 26 people to recruit. Which if you add the maths up, that's 37 people and where I said we were about 9 people, and we're up to 55 now. Those two grants contributed to that" (Participant C)
Human capital	"It's absolutely critical, if people don't get on in work, you can forget it" (Participant C) "It means everybody chips in a little bit more" (Participant D)	"it's vital" [...] "if your team doesn't get on well just forget it" (Participant A) "Development of the team was the success of the business. As a service industry you are all dependent on the last telephone call, or how well the team works together to react to clients' needs"(Participant A)
Management	"I think the key one is obviously key staff, so if you haven't got the right staff in place, they won't invest" (Participant B)	"It was seeing that similar ownership of things. It's not just I come to work and I do the job. If you don't have that it's not going to work" (Participant A)
Expertise	"If you look at their business cards, they've all got the title of Managers. But it depends what you mean. The term Managers I suppose tends to mean that you manage staff and none of them manage staff. They manage the business collectively" (Participant A)	"X kind of had the foresight to realise there was a shift and he started recruiting some key individuals who were running the company on a day to day basis" (Participant D)
Contacts	"You have to be extremely technically knowledgeable in order to convince those companies that you have the technical skills to give them what they want" (Participant A)	"He can become a QP because of his background and he brought another QP in. So they started to do the sort of clinical services work before the legislation was formally in, so they were at the forefront of it when it was formally law" (Participant F)
Open innovation	"Our contacts are with suppliers, we know literally all of the American, Chinese and European suppliers in the field of Optoelectronics. Through my contacts components now come into us far cheaper" (Participant A)	"You get introduced to people, start meeting people, collecting business cards and following up on calls. The WDA funded me going to different meetings quite often, and that was critical to growing the business" (Participant A)
Customers	"With Y we've had material resources and support in terms of the specification. And from X they've recruited staff up there to support the project internally. So those resources have been available to us" (Participant B)	"We're developing a product and some intellectual property, which will potentially allow us to strengthen our brand. But it's complimentary with what we do, it's not something completely different" (Participant B)
Software	"Without those relationships we wouldn't have had the financing from them paying us to develop it that we've had to this date. So those companies have been fundamental in maintaining our livelihood" (Participant A)	"[...] one of the first clients was Y, purely because that's where the founder came from, and to this day we work with Y" (Participant C)
Software	"Without software, an optical company couldn't exist. We have electronic, mechanical, optical design and test software as well as financial packages"(Participant A)	"We used to have Sage financial, but we put in April 2010, Sage 200 which is an MRP system. That drives the entire process financials. Because you book all your purchase orders in, generate sales orders, generate invoices, logs people's time, gives you profitability. So that's absolutely vital" (Participant C)

Table II.
Case study data highlighting the impact of resources on cases A and B

Note: Resources – factors which enable the firm to function and without which the firm would not be able to develop

Resources	1: low	2: intermediate low	3: intermediate high	4: high
Aspirations	There is no vision for the future aspirations of the firm	A vague aspiration for the firms future begins to develop but this is not widely communicated or solidified	<i>Clear growth aims are developed which are widely communicated both internally and externally</i>	After achieving initial growth the firm aims for further growth and vision and mission statements are generated in line with this
Technical and commercial expertise	Necessary business and technological expertise is lacking in order to develop commercialised products and services		<i>A good level of expertise in the area develops with directors and key managerial members. Enough technical expertise is present to undertake product development and enough commercial expertise is present to ensure products are market ready</i>	Firm wide technical and commercial expertise develops to a high level through activities such as the recruitment of further staff, experiential learning and open innovation
Finance	The firm has a small amount of start-up finance. Finance is managed informally and there may be some use of finance software	The firms finance increases through loans, grants or revenue. External accountants may begin to manage the firm's finances	<i>The firm's revenue and financing reaches a high enough level to fund the firms product/service development to the point of commercialisation and to enable a sufficient number of staff to be employed to manage the firm and undertake key tasks A finance director may be appointed</i>	The firm creates budgets for departments and financial management becomes more complex
Management	The owner/s are the only "managers" of the firm	<i>A small number (one relating to each department of the business e.g. business development, operations, product development) of key staff are employed who are able to bring new resources to the firm such as contacts and who are able to manage the firm as a collective</i>	Further key appointments are made and a more corporate and formalised management structure is put in place	A second-tier management team is appointed
Human capital	The firm has no employees	Staff begin to be recruited, relationships forge and team work begins	<i>More staff are recruited and a close knit team is formed with good employee relationships; team work increases with staff numbers. These staff manage the firms resources and aid in knowledge sharing</i>	Staff numbers increase further and as a result staff relationships become more distant. Over time good employee relationships begin to develop again. Team work now takes place within and between departments
Open Innovation	The firm does not engage in open innovation with any external company		The firm engages in open innovation with external customers/ suppliers and knowledge sharing is crucial	<i>Open innovation results in improved product/ service outputs for the firm and high knowledge gain</i>

Table III.
The resources, their process of development and the level to which they need to be developed to for growth to occur (indicated in italic)

(continued)

Resources	1: low	2: intermediate low	3: intermediate high	4: high
Contacts	The firm has a small number of contacts that are utilised in order to aid the firm's early development	New contacts are gained in a \variety of areas and as such the network and contact base of the organisation increases	<i>The firm's relationship with their contacts reaches a high level as the products and services develop with face to face relationships and rapport. Contacts are evident in the areas of finance, government, suppliers, customers and informal contacts. These contacts provide advice, finance, knowledge and equipment</i>	New contacts are continually gained meaning that the firms contact base reaches a high level with a high variety of contacts in a wide variety of areas
Systems and software	The firm has a small amount of unofficial quality procedures	The firms quality procedures begin to increase and relevant software packages are brought into the company	<i>Quality procedures are implemented to a high level and the firm's use of software increases which aids the firm's resources in functioning to a high level</i>	The firms processes begin to develop to a high level appropriate to, and in line with, their growth
Customers	The firm gains their first customer	The firm's customer base begins to increase and so too does the firm and the customers understanding of what needs to be supplied. Customer relationships begin to develop	The firms relationships with their customers reach a high level and knowledge sharing is vital	<i>The firms customer base begins to diversify and the quantity/quality of the firms customer base reaches a point whereby it is providing stable high revenue to the firm</i>

Table III.

Even though each case experienced differences with regard to the speed of development of each resource, due to their developmental stage, they ultimately developed towards the same goal and the factors influenced each firm in similar ways. The complex developmental processes which each of these resources go through highlights their dynamic nature and yet there is a "sweet spot" of development at which point they are at their most influential to firm growth. In order to form a base for achieving high growth and development, a firm must achieve a mixture of "sweet spots" for each resource (Yandle, 2014). Without these resources neither case would have been in a position to develop as all of these resources aided in the creation of mediating factors and enabled the creation of outputs for the firm, which resulted in an increase in revenue and staff, and as such growth. New resources were continually added to the firm through the development of each resource and the impact of each resource on another, e.g. contacts providing further knowledge which impacts the firm's expertise. It is the interconnected nature of each resource which aids in the achievement of firm growth.

The impact of these resources on two firms at very different stages of development highlights that resources are consistently of importance and will constantly be in a state of development. These resources are generated both internally and with external help and as such it is not possible to separate the firm from its external network. The interaction of both internal and external is of vital importance to resource development. Many of the resources identified are intangible and thus highlight how difficult it can be for them to be identified and controlled. Aspirations, contacts, customers, open innovation, human capital, management, expertise and learning are all intangible assets, while finance and software are tangible assets. Therefore, the majority of firms' resources are intangible,

which may be due to these firms being highly knowledge based. However, the use of the research methods employed in this study means that the influences of these less easily observable factors have been discovered. These intangible resources interact with the tangible resources to enable them to develop, i.e. human capital relationships affecting finance and product/service development. This again highlights that one factor cannot be considered without reference to the others.

The resources are in a continuous state of development and it is this development which aids each factor in influencing the firm's growth. For instance, without continual development of the firms' human capital and expertise the firm would be in a less advantageous position from which to develop products and services. This highlights the dynamic nature of the resource base. Some of the resources highlighted influence the firm directly while others influence other factors, which influence others, in a chain like fashion. The majority of the resources exert both indirect and direct effects on the firm's development. However, it is this constant linking of the resources which means that no-one resource could enable the firm's development without the others.

The comparative analysis highlights that resources are in a constant state of change and fluidity throughout a firm's life. In particular, the human capital and managerial resources are the most complex. Resources are continually added to throughout firm development with some resources completely changing from their state at start up to their growth state. Resources play an important part in a firm's development during all stages of its life being just as influential, if not even more so, during and after growth, than they were at start up. This suggests that resources are a dynamic tool which not only lay the foundations for the firm's development and growth, but also propel further development and growth at later stages.

Mediating factors

It also became apparent that in each case these resources were not enough to enable firm development and certain factors emerged which were used to mediate other factors and manage the resources. These mediating factors consist of: organisational structure, strategy, planning, systems, marketing, human capital and management. These factors all relate to the management of the firm and its resources and without them the firm's resources would not be able to function to a high level. Strategy was found to be used to create plans to manage the rest of the organisation and their resources. Case B eventually created different hierarchies and departments responsible for the implementation of different parts of the firm's strategy, allowing time for higher level management to concentrate purely on strategy creation. Closely related to strategy was planning, used by the organisations to enhance their product/service development and customer service. Planning impacted all areas of the firm, enabled finances to be utilised appropriately and in case B enabled employee development. In case B, individual and departmental objectives were created and eventually day-to-day planning was delegated to second-tier management, again allowing focus between departments and higher level strategic thinking to take place. Planning enabled both cases to implement strategies and focus their activities. Organisational structure was crucial in managing other parts of the firm and in the early stages of both firms structure was informal encouraging knowledge sharing. Case B then progressed further whereby a highly functioning structure was in place, with different hierarchical levels, functional non-overlapping roles, multiple layers of delegation and well-established departments, all of which enabled top management to focus upon strategic planning as opposed to strategic implementation.

Marketing and market research was used to provide guidance and support to the firm's products and services and aided in the generation of further customers. Both firms highlighted the importance of quality procedures to the everyday functioning of the firm and

in the gaining of customers. In both cases, quality processes were used by everyone in the firm in all departments, highlighting their benefits in enabling the development of structure.

Again a mixture of certain "sweet spots" of development is required to enable the mediating factors to aid in firm growth (Yandle, 2014). These mediating factors may not directly influence growth but do so indirectly through their influence on other factors such as resources, other mediating factors and output factors. Therefore, their influence on the firm may be less obvious unless the whole firm system is analysed. For instance, organisational structure does not have a direct influence on growth but it aids in the flow and effectiveness of human capital and product/service development. The resource factors and the mediating factors could not develop without the other. An important point to note is that in both firms these mediating factors were created by the resource factors thus highlighting how the resources are the building blocks of the firm, while the mediators can be considered as the cement which holds them together.

The factors human capital and management are both resources and mediating factors. For instance, the knowledge and skill of the employees' aid in the development of the firm's products, while their management skills aid in the running of the firm. However, they also mediate all other resources and outputs by managing their transfer from resources into outputs. For instance, the human capital aids in finance applications and in managing the open innovation which the firm engages in. They also mediate the development of the firm's products and innovation. In order for a resource to also be considered as a mediating factor, it has to be crucial to the management and transfer of resources to outputs.

Each of the mediating factors detailed previously serves to aid in the development of the firm's resources and to enhance the impact of the resources on the firm. The mediating factors go through their own developmental process and have an impact on the firm even if this is not direct. For instance, organisational structure affects team relationships which affect productivity. The mediating factors not only influence the resources, but they also influence each other and the output factors. Without these mediating factors, the development of the firm's resources would not occur and the production of outputs would not result. The mediating factors and sample case study data highlighting their impact on the firm are shown in Table IV.

The complex nature of the firm's resources and their dynamic nature means that these mediating factors are a crucial part of the firm's development. The resources would be unable to develop and be utilised effectively were the mediating factors not present. The main role of the mediating factors is to support the resources in their development and as such resources cannot be considered without reference to mediating factors. The mediating factors identified, their process of development and the level to which they need to be developed to for growth to occur are shown in Table V.

Output factors

None of the resources or the mediating factors will, by themselves, enable the firm to achieve high growth. In order to do this, outputs are required which are saleable and which ultimately are what is used to increase the firm's revenue and human capital. These output factors consist of: new and existing product/service development. Again in order to enable the firm's development, this output factor needs to hit its "sweet spot" of development (Yandle, 2014). This output factor enables further resources to be brought into the firm and so the resource > mediating > output cycle continues. This explains how growth is a continuous process and can continue over many years in different spurts. Output factors are highly influenced by mediating factors and resource factors. What became evident was that the resources in both firms influenced far more factors directly than did the output factors and this is because output factors are exactly that, an output, and as such tend to result in finance and employees and influence the firm through those. In a similar analogy to that

Mediating Factors	Case A	Case B
Organisational structure	“[...] two teams [...]one being the engineering room [...]. Then there’s the sort of more day to day commercial managerial team”(Participant E)	“They’ve certainly become more specialised [...] as you grow, you need a little bit more definition into people’s roles, otherwise it’s going to lead to a lot of confusion” (Participant D) “[...] as the business started to grow we sort of identified the need for a senior management team [...] to guide the business in a coherent manner” (Participant F)
Strategy	“There was a strategy [...] to create a number of key cash cows, which are easy to build and get the revenue turning over. And then alongside that get the products which are non-linear growth which has the potential to be a big sell” (Participant B)	“Development of the team was the success of the business. As a service industry you are all dependent on the last telephone call, or how well the team works together to react to clients’ needs”(Participant A)
Planning	“In any high-technology organisation, you have to think 6, 12 months ahead and 3, 5 years ahead. If you don’t do that, you’re dead in the water, you aren’t ever going to get there. It’s all a matter of planning” (Participant A)	“Development of the team was the success of the business. As a service industry you are all dependent on the last telephone call, or how well the team works together to react to clients’ needs”(Participant A)
Systems	“[...] we can give the customer what he needs and be confident that we’ve given him what he needs because our quality systems in place” (Participant E)	“We used to have Sage financial, but we put in April 2010, Sage 200 which is an MRP system. That drives the entire process financials. Because you book all your purchase orders in, generate sales orders, generate invoices, logs people’s time, gives you profitability. So that’s absolutely vital” (Participant C)
Marketing	A lot of it is the credibility of the staff on a technical front. Because if they couldn’t see any technical engagement there, they obviously wouldn’t invest with us”(Participant B) “We analyse whether there’s a potential market there, how the product’s differentiated, what’s the price? And that’s assessed before we kick off the project” (Participant B)	“X and another BD manager came in and they really started to increase awareness of websites and marketing literature and conferences and whatnot to expand the company name” (Participant F)
Human capital	“We’ve got three little teams. And everyone as a group. You know, pals, colleagues. If everyone’s working on projects that they’re best suited for, then that’s got to work, hasn’t it?”(Participant C)	“Development of the team was the success of the business. As a service industry you are all dependent on the last telephone call, or how well the team works together to react to clients’ needs”(Participant A)
Management	They manage the business collectively” (Participant A)	“The initial spurt of growth was X coming in and helping to form a business development group with some, well pretty small at first, business development activities” (Participant F) “It’s clearly enabled the growth that’s come over the last 5-6 years. And it’s also enabled us to put the processes, get the key staff in place, to sort of take it through the next level of growth over the next 3-5 years” (Participant C)

Table IV.
Case study data highlighting the impact of mediating factors on cases A and B

Note: Mediators – factors which enable the management of resources and outputs and which enable the transfer of resources to outputs

Principles of
Penrose's
(1959) theory

Mediating factors	1: low	2: intermediate low	3: intermediate high	4: high
Management	The owner/s are the only "managers" of the firm	<i>A small number (one relating to each department of the business, e.g. business development, operations, product development) of key staff are employed who are able to bring new resources to the firm such as contacts and who are able to manage the firm as a collective</i>	Further key appointments are made and a more corporate and formalised management structure is put in place	A second-tier management team is appointed
Human capital	The firm has no employees	Staff begin to be recruited, relationships forge and team work begins	<i>More staff are recruited and a close knit team is formed with good employee relationships; team work increases with staff numbers. These staff manage the firms resources and aid in knowledge sharing</i>	Staff numbers increase further and as a result staff relationships become more distant. Over time good employee relationships begin to develop again. Team work now takes place within and between departments
Organisational Structure	The firm may have no company offices. The owners are likely the only shareholders	The firm may acquire its first office and a very small amount of equipment. Communication is informal and although staff roles are specialised there is a high degree of role overlap	<i>The firm may acquire more premises. Employees are overseen less and have a good level of autonomy. Formal internal team meetings begin to take place. Departments begin to be created and a corporate structure develops. Staff roles become specialised with less overlap. A highly functioning structure is in – place in which there are clear roles in order to aid in the day-to-day running of the firm and its resources</i>	A multi-layer corporate structure develops with different levels of management. Delegation flows downwards throughout the managerial levels and communication becomes more complex
Systems and software	The firm has a small amount of unofficial quality procedures	The firms quality procedures begin to increase and relevant software packages are brought into the company	<i>Quality procedures are implemented to a high level and the firm's use of software increases which aids the firm's resources in functioning to a high level</i>	The firms processes begin to develop to a high level appropriate to, and in line with, their growth

(continued)

Table V.
The mediating factors, their process of development and the level to which they need to be developed to for growth to occur (identified in italic)

Mediating factors	1: low	2: intermediate low	3: intermediate high	4: high
Marketing	There is no formal marketing plan in place and little or no marketing is conducted. The firm engages in a small amount of market analysis	The firm begins to exert more resources towards market analysis and marketing	<i>The firm begins to develop a professional image and a good reputation within the industry. The firms marketing efforts reach a high level with a clear focus on business development</i>	A marketing plan is created and brand development takes place. There is a clear focus on business development and sales pipeline
Planning	There is a low level of planning undertaken, if any	Planning begins to be implemented in order to aid product/service development and cash flow	<i>Planning becomes more complex involving every area of the firm from finance, to sales, to general day-to-day planning. These provide goals upon which to focus the firms resources</i>	Planning becomes more formalised through the introduction of individual objectives and departmental objectives

Table V.

used previously, if the resources are the building blocks of the firm and the mediating factors are the cement holding them together, then the outputs enabled by this are the completed house. Without these outputs the firm cannot be complete.

All of the resources and mediating factors detailed previously culminate in the production of outputs which the firm can sell and which characterise the firm as a whole. As such, there are far less output factors than mediators or resources. For instance, the market analysis which the firm undertakes leads them to new and existing product/service development, while human capital and management enable the strategy to be enacted. Again, as was the case with the mediating factors, the influence they have on the firm is less tangible than others. Their influence is important but comes through their saleability which leads to further effects on other factors and to further development by other factors. All factors exert an influence on the output factors and the output factors are ultimately the core of the firm's survival and growth. However, without the interaction between the outputs, the mediating factors and the resources no factor would be able to develop and result in the firm's growth. It is the resources which exert the most influence on other factors, while the mediating factors play more of a supportive role and the output factors are affected by other factors more often than affecting factors themselves. The output factor and sample case study data highlighting its impact on the firm are shown in Table VI.

Overall, the firm begins with a number of resources and these are used to develop the mediating factors. The mediating factors then result in more resources being generated and existing ones being developed further. The resources and mediating factors together then enable the generation of output factors for the firm which then result in more resources for the organisation and the development of existing ones, thus enabling competitive advantage. These linkages are shown in Figure 2. The output factor identified the process of development and the level to which it needs to be developed to for growth to occur is shown in Table VII.

Reconceptualising Penrose's theory and the RBV

The findings from this research confirm many of Penrose's findings but importantly add new insight to create a fresh perspective. It is confirmed that the firm is a bundle of

Output factors	Case A	Case B
New and existing product/service development	"It's been a natural progression. We started off with one project with X. And that's evolved into 3 products. We started off with one product in Endoscopy, that's moved into 2" (Participant A)	"[...] the services developed by discussion with clients, you know what do you need and we were often able to develop services specifically for them" (Participant F) "We're developing a product and some intellectual property, which will potentially allow us to strengthen our brand. But it's complimentary with what we do, it's not something completely different" (Participant B)

Table VI. Case study data highlighting the impact of output factors on cases A and B

Note: Outputs – factors which enable revenue to be brought into the firm and which ultimately enable growth in revenue

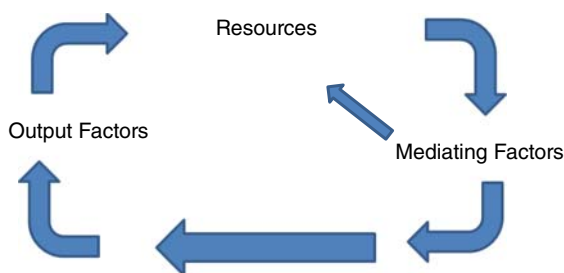


Figure 2. Conceptual linkages in the framework

Output factor	1: low	2: intermediate low	3: intermediate high	4: high
Service/Product development	The firm has a basic service/product offering even if this is only in its concept stage	The firm develops products and services often involving prototypes and in house testing. There is a constant improvement of existing offerings	Customer testing of the firms product may take place and multiple product/service lines emerge for the same customer	<i>Products/services are developed to a high level to the point at which they are well established and where there is widespread customer acceptance and take-up. New products/services continue to be developed</i>

Table VII. The output factor, its process of development and the level to which it needs to be developed to for growth to occur (indicated in italic)

productive resources which are controlled by the administrative hierarchy and which combine to produce goods for sale (Penrose, 1959), as this is exactly the explanation for the findings that is being posited here. The key new insight that this research provides is detailed information with regard to which resources, management and outputs are vitally important, why this is the case and how they develop over time. Although Penrose's theory has been highly influential in academic circles, it has not been able to be practically disseminated. This stems from the lack of clear identification of process and the lack of a coherent model stemming from the theory. This research, however, has added to this body of knowledge, providing the detail needed to explain and support Penrose's theory, clearly identifying the process of development. Penrose posits that firms can have differing amounts of resources, whereas this research argues that firms must have the correct mix of

certain resources, developed to specific levels in order to achieve growth. Thus, this research provides more detail with regard to each factor found to have been of importance.

Penrose also argues strongly for the importance of material resources and while this research did find that material resources were of importance to firm growth it also found that intangible resources were just as important and that it was the combination of the two which gave the firm the best chance of development. This research accords with Penrose's argument that it is the outputs which the resources and management of these resources enable which is ultimately what enables the firm's growth.

Penrose focusses on the importance of management within the firm and this research confirms this through the finding that management act not only as a resource to the firm but also as an organising transfer for resources to outputs. However, this research highlights the crucial overlap between early human capital and informal management and later more formal management. This research also provides support for Penrose's emphasis on the importance of team relationships, as it was found that this was one of the most important resources used by both cases enabling good product/service provision and knowledge sharing. The finding that human capital in particular experienced a regression during growth due to a lack of familiarity of the new team structure adds weight to Penrose's view that firms are constrained when management does not have experience working together. Penrose also argues that management is crucial in spotting opportunities for the firms resources, whereas this research found that although owners are crucial in this process it is also informal managers, human capital in general and customers and suppliers who are now involved in this process. This could be due to the emergence of the open innovation business model (Chesbrough, 2003; Curley, 2013). The finding that the resources identified in this research was utilised for numerous purposes within the firm accords with Penrose's suggestion that resources can be recombined in different ways for different reasons.

This research also highlights changes which have taken place with regard to economy and technology, since Penrose's theory was created and adds new insights more relevant to the modern economic era. The key factor relating to this was that of open innovation which was clearly highlighted in both cases as being vital to their development. This research also highlights the importance of inter-firm relationships which are of importance for similar reasons as Penrose's intra-firm relations. Another factor, that of contacts, which relates to external supply of resources was also not considered as influential by Penrose, whereas in this research it was one of the most important factors influencing each case. Clearly, this research adds to Penrose's theory through its inclusion of externally oriented factors and thus highlights that the boundaries of the firm can now become more blurred. This research also accords with Penrose's argument for the importance of learning within the firm but highlights that this learning can come from within the firm but also externally to it. External resources provide knowledge, contacts, tangible equipment and finance. Penrose's theory was generated based upon case studies of large manufacturing firms and therefore the current research provides insight into the applicability of her claims in product-/service-/knowledge-based SMEs. As highlighted above, this research not only accords with many of her principles but also offers slight additions to them especially with regard to importance of intangible resources, thereby confirming extant literature (Barney and Arikan, 2001; Riley and Robinson, 2011; Dal Borgo *et al.*, 2012; Salmelin, 2013).

The key insight which this research provides with regard to the RBV is through the identification of exactly what resources are important to a firm's development, why this is the case and how these develop over a firm's life, insight called for by Arend and Levesque (2010) and Lockett and Wild (2014). This is an important distinction from the RBV which only state types of resources which are of importance. The identification of critical "sweet spots" for each resource in this research also suggests that resource-based research needs to analyse resources from a process-based view in order to understand how these resources

influence growth. This identification also enables more direct and focussed advice to be given to firms than the RBV's principles allow. Therefore, this research explains the interrelations between resources, insight called for by Salazar (2017). Similarly to Penrose's (1959) view, this research found that no-one resource was of primary importance but rather it was the combination of them which aided firm growth. This research does disagree with some of the RBV claims such as the argument that resources need to abide by certain principles in order to be a resource. This research discovered that a resource did not necessarily need to be rare, or hard to imitate in order to aid the firm, supporting Frery *et al.*'s (2015) and Warnier *et al.*'s (2013) research, but instead needed to reach a certain level of development in order to aid the firm. As such, this research argues that level of development is more important than uniqueness to the firm.

Importantly, the research findings accord with Barney and Arikan (2001) who suggest that the firm needs things other than resources in order to achieve growth. A key insight is derived from the factors open innovation, human capital, expertise and contacts, which highlight that resources can also be gained from external sources. The importance of external resources suggests that resource development in the modern firm relies on involvement in a quadruple helix of relationships involving customers, universities, government and the SME is question. This research provides a new perspective, slightly different to that of the RBV in that the RBV describes resources in the context of strategic advantage and competitiveness, whereas this research provides an analysis of these resources in the context of firm growth.

The majority of the resources identified in this research, excluding external resources, are also identified in Penrose's (1959) theory, suggesting that this research provides a vital synthesis between the two theories. This research also adds to the knowledge of the applicability of the RBV to knowledge-based SMEs and highlights that the RBV is of importance to an explanation of firm growth but that certain additions need to be made to the RBV in order for it to explain firm growth in the current climate. For instance, this research found that intangible resources are of vital importance to knowledge-based firms and are crucial in aiding the firm in achieving growth. Relationships in particular enable the emergence and development of new resources the firm can use to aid its growth.

Finally, the results link very well with the dynamic capabilities view of the firm (Teece *et al.*, 1997) but are able to further knowledge on this area through the identification of the key dynamic capabilities required, under the theme of mediating factors. Wu (2007) defines dynamic capabilities as mediators and this research confirms this definition. The identification of the exact dynamic capabilities or mediating factors required overcomes the main criticism of the dynamic capabilities view which is that it is too vague (Priem and Butler, 2001). The linkage between the new conceptual framework and existing theory is shown in Table VIII, with a detailed description of new knowledge added. A figure detailing the linkage between the extant literature and the new conceptual framework is shown in Figure 3.

Discussion and conclusion

The aim of this research was to reconceptualise two dominant theoretical perspectives within the firm growth literature. This was accomplished through merging the theories and by conducting empirical research resulting in the generation of a new firm growth framework. As a result, this research addresses a distinct gap in the theoretical firm growth literature and makes a clear contribution to the literature. The results indicate that an explanation of the modern firm growth phenomenon requires a multi-theoretical approach. Crucially, the empirical research showed that the principles of the theory of the growth of the firm, the RBV and the dynamic capabilities perspective can be combined and reconceptualised in a new framework that is capable of providing a more specific

New theoretical framework	Linkage to existing theory	New knowledge obtained	
Resources	<i>Penrose concepts linking to resources</i> The firm is a bundle of productive resources	The exact resources that are required in order for a firm to achieve growth Why it is these resources that are required Identification of the process of development of these resources	
	The firm can have differing amounts of resources	A firm must have the correct mix of certain resources, developed to specific levels to achieve growth	
	Material resources are of great importance	Both material and intangible resources are crucial for firm growth	
	Management are crucial in spotting opportunities for the firm Intra-firm relationships are crucial	Informal managers, human capital in general and customers and suppliers are also crucial to this Intra-firm relationships are crucial but so too are inter-firm relationships	
	Firm development stems from within the firm	Open innovation is crucial to the development of knowledge-based firms Resources can be gained from outside of the firm The boundaries of the firm can now be considered blurred	
	<i>RBV concepts linking to resources</i> Resources that are valuable, rare and hard to imitate are critical to the achievement of firm growth	Identification of the exact resources that are required in order for a firm to achieve growth Why it is that these resources are required Identification that it is critical the resources develop to a certain level in order to enable firm growth	
	Mediating factors	<i>Penrose concepts linking to mediating factors</i> Resources are controlled by an administrative hierarchy Management are crucial to firm development, especially due to their impact on resources	The mediating factors that enable the control and development of resources Management acts not only as a resource to the firm but also enables the transfer of resources to outputs There are factors other than management that enable this management of resources Informal management is just as important as formal management
		<i>RBV concepts linking to mediating factors</i> The firm need things other than resources to achieve growth	Identification of exactly what it is that firms require apart from resources in order to achieve growth These factors enable the transformation of resources into outputs
		<i>Dynamic capabilities view concepts linking to mediating factors</i> Dynamic capabilities enable the integration and use of resources	Identification of exactly what dynamic capabilities or moderators SMEs need in order to achieve growth Identification of the resources that they link with and how these two concepts combine in a cyclical nature enabling growth
		Output factors	<i>Penrose concepts linking to output factors</i> Outputs (obtained through resources and the management of these) are what enable firm growth

Table VIII.
Linkages between the new conceptual framework and extant research, including new knowledge added

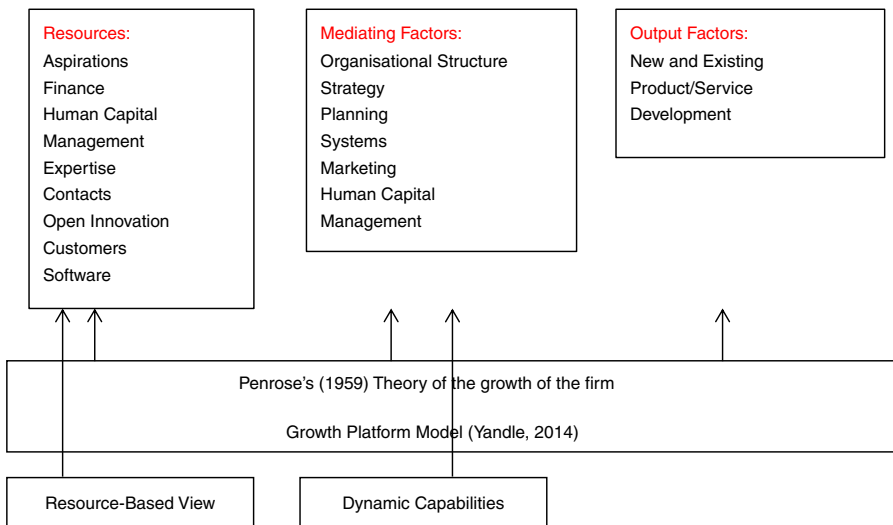


Figure 3.
Extant theoretical
linkages with new
empirical framework

explanation of the firm growth process. As has been accepted throughout the paper these findings are exploratory, providing an excellent starting point for further confirmatory research to be conducted on the concepts.

The most crucial contribution that this research makes is through the identification of specific resources required in order for firm growth to be achieved, the identification of specific dynamic capabilities required to utilise the resources and the identification of output factors that the resources and mediators enable. This is key to overcoming the key limitations of the RBV and the dynamic capabilities perspectives in that they are considered too vague. This is something that prior research has not yet been able to achieve and yet which is vital for the growth and development of SMEs in particular to be enabled. The fact that the framework is grounded in existing, heavily cited theories and yet is able to combine and reconceptualise these gives it more credibility.

There are a number of key contributions that this research makes, from the linking of separate theories to the development of a new framework with which to explain firm growth and development. This new framework is steeped in existing theories and yet is able to expand upon them, providing a process-based explanation for firm growth. The aim was to create a conceptual framework to accompany Yandle's (2014) growth platform model and this was achieved. The resultant framework highlights that a multi-level theoretical approach is required, one that includes factors at various levels of analysis. Firm growth in the modern knowledge-based society in which we live takes place through network wide factors, individual factors and firm level factors, all of which have to interact to enable firm growth. The large number of factors encompassed in the framework suggests that academics and policy makers must be prepared to research a wide range of factors at different levels of analysis.

It was found that the factors enabled firm growth through their interactions and influences on each other. By analysing the level to which each factor needed to be developed to in the growth platform model (Yandle, 2014), it was identified that the resources must all be developed to a level where they are providing the firm with the foundations needed from which growth can stem, enabling product/service development, firm development and staff development. The mediating factors must be developed to the point at which they are supporting the resources and outputs in functioning to a high level, while the output factors

must be developed to the level at which they are providing the firm with revenue and new resources. It is the interaction of these resources, mediating factors and output factors which enable growth. This finding is important as it suggests that there is a pattern in the way in which factors influence growth, meaning that more structured research and policy decisions could take place focussing on these interactions. For instance in combination with the growth platform model, policy makers could analyse organisations to determine which areas of the framework organisations need the most support in. This could be in developing their resources, supporting the mediating factors or supporting the outputs. Crucially, the framework suggests that whichever area policy makers are able to provide support in then the other areas of the framework will benefit. This approach could be particularly beneficial to SME policy development as SME assistance is often personalised and one to one, something that this framework lends itself to well. Further work needs to take place in an attempt to transform these findings into a self-assessment tool for use by all SMEs.

The majority of firm growth research identifies which factors may be of importance and some research works suggest how these factors influence growth but there is a distinct lack of integrative research which also analyses relationships and provides an explanation as to how factors enable growth. The framework developed through this research suggests a new context, in which to research and place firm growth variables and as such provides a base from which further research can stem.

The framework was created with practicality in mind and therefore the framework should be able to be disseminated with its accompanying growth platform model (Yandle, 2014) to SME practitioners and policy makers, as well as being disseminated academically. The framework will be of use to practitioners as it enables them to understand how the different parts of their firm interact to enable firm growth to be achieved. This understanding enables an abstract process to be made concrete and observable. Practitioners could determine which parts of the conceptual framework require the most amount of improvement and which are developed to an acceptable state. However, further research is required in order to test this framework on a wider range of firms in order to test the level to which it can be generalised. For instance, are the same themes discovered as well as the same factors being encompassed beneath them? This research is a vital step in the right direction towards the generation of a new conceptual framework for firm growth theory that is capable of explaining firm growth in modern economic society. However, there are additional advances to be made and the framework generated through this research requires further testing and development.

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