Building on the theory of the growth of the firm to develop an attitude and time based view of the firm.

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Thesis submitted for the degree of PhD (Doctor of Philosophy) to the School of Business in the University of Buckingham. Submitted Mar 2020.

Abstract

We do not have today a commonly accepted theory that explains how and why firms behave as they do. This research seeks to address this gap and improve theoretical understanding of firm-level behaviour and performance. This research considers different theoretical perspectives and argues that the strategic perspective is the most appropriate level to investigate firm-level behaviour. At this strategic level, this research challenges the widely used resource-based view and instead calls for a return to the theory of the growth of the firm. Contrary to most contemporary research, this research argues that the theory of the growth of the firm is distinct from, and superior to, the widely used resource-based view. Despite arguing for a return to the theory of the growth of the firm, this research identifies and seeks to address important gaps in the theory. It does so by developing a new conceptual framework, defined as the Attitude and Time Based View (ATBV) of the firm. The new framework is underpinned by the theory of the growth of the firm and complemented by ideas from the theory of planned behaviour. In line with these theories, the ATBV framework proposes that the most important resource available to firms is management time, and that management attitudes determine how management time is used by firms. This research tests the ATBV framework using a two-year longitudinal case study methodology with a large logistics service provider (LSP) firm that seeks to carry out a planned strategic change to develop a new Product Service System (PSS) business model. The data collected are analysed using a newly developed DISC (Direction, Importance, Strength and Consistency) score of management attitudes. The findings from the analysis demonstrate how management attitudes evolved, how the change in attitudes impacted the allocation of management time and how the change in management time allocation impacted the performance of the firm. An assessment of the research methodology reveals several limitations. In particular, the potential for research bias is highlighted due to the researcher performing the dual role of researcher and employee. The mitigating actions taken to minimise the limitations are provided. The research concludes that the theory of the growth of the firm and its focus on management time does provide useful insight into firm-level behaviour and performance. The conclusions from this research are found to link closely with the concept of ambidextrous firms and how firms seek to find the right balance between exploring and exploiting productive opportunities. This research has theoretical and practical implications. From a theoretical perspective, the research provides a new conceptual framework and methodology to investigate firm-level behaviour and performance. From a practical perspective, the research encourages managers to reflect on their own attitudes and the attitudes of those around them and also encourages managers and firms to consider how they use their time, and how this ultimately affects the behaviour and performance of the firm.

Acknowledgements

I would like to take the opportunity to thank the many people who have helped me to complete this research and thesis.

Thank you to Kelly, for your patience, understanding and support!

Thank you to my parents for all their support and help over many, many years.

Thank you to Pauline. I would not have known where to start without your direction, guidance and supervision during every step of the research. I bet you thought it would never end! Thank you for everything.

Thank you to Maneesh whose advice, expertise and insight helped to improve the thesis greatly and whose support and supervision helped me get the final version over the line.

Thank you to all of the colleagues at CasComp who were kind enough to give their time and ideas that all contributed to this research, and particularly to Mike who provided many ideas and gave me the time to get them down on paper.

Thank you to the many, many people at Buckingham University and Cardiff University who have provided encouragement, advice and support along the way. There are too many to name individually, but thank you all.

Last but not least, thank you to Jan and Sharon for reading and examining the final version of this thesis and providing useful and constructive feedback for further improvement.

Declaration of Originality

I hereby declare that this research is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the related publications section and specified in the text, and is not substantially the same as any that I have submitted, or, is concurrently submitted for a degree or diploma or other qualification at the University of Buckingham or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my research has already been submitted, or is concurrently submitted for any such degree, diploma, or other qualification at the University of Buckingham or any other University or similar institution except as declared in the Preface and specified in the text.

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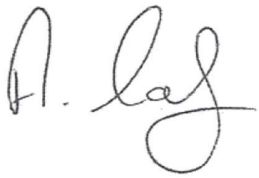

Date: 24 July 2020

STANDARD ETHICAL APPROVAL FORM

This form should be completed for every research project that involves human participants. It can also be used to identify whether a full application for ethics approval needs to be submitted. The researcher or, where the researcher is a student, the supervisor, is responsible for exercising appropriate professional judgement in this review. This checklist must be completed **before** potential participants are approached to take part in any research.

SECTION 1 - RESEARCH CHECKLIST

1.1	Does the study involve holding personal information (names, attributable information or personal identifiers of any form) on a database?	~~YES~~/NO
1.2	Does the study involve participants who are particularly vulnerable or unable to give free and informed consent (children, people with learning disabilities, students in academically dependent relationships)?	~~YES~~/NO
1.3	Will it be necessary for participants to take part in the study without their full knowledge and explicit consent (perhaps through covert observation)?	~~YES~~/NO
1.4	Will the study involve discussion of sensitive topics (political or religious views, illegal activities, sexual activity, drug use and so forth) that could be uncomfortable to participants or harmful if divulged to others?	~~YES~~/NO
1.5	Will the study involve potentially harmful procedures of any kind or be conducted in a hazardous environment that could expose the researchers or participants to higher risk than is encountered in normal life?	~~YES~~/NO
1.6	Will financial inducements (cash, vouchers or a prize draws) be offered to participants?	~~YES~~/NO
1.7	Will the study involve patients or patient data in the NHS?	~~YES~~/NO

If you have answered 'NO' to all questions 1.1 to 1.7 above, please complete this form and submit TWO copies to Mrs Debbie Stanbury in room AdR128. Both forms will be stamped as evidence of submission. One copy will be retained by the School for audit/office purposes and the other by

the researcher/s. Undergraduate and postgraduate students should include/bind their copy of the form with their research report or dissertation.

If you have answered 'YES' to any of the questions above, you will need to complete a full ethical review form (ETHICS 2, available on the VLE)

SECTION 2 PROJECT DETAILS

Title of Project:	Building on the theory of the growth of the firm to develop an attitude and time based view of the firm
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Status (please circle) :	~~Post Graduate Taught~~ / Post Graduate Research / ~~Staff~~
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Start and Estimated End Date of Project:	25th January 2015 – 20th December 2020

SECTION 3 STUDENTS ONLY

Module name and number	
Supervisor's or Module Leader's name	Dr Pauline Found
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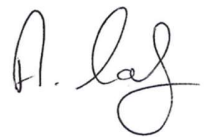
SECTION 4

Briefly describe the study design to be applied in the project including methods of data collection and data analysis

The research design uses a single case study (a large logistics firm) with data collected over a 2-year period. The logistics firm has provided authorisation to carry out the research. The primary data collection method used is observation, which is supplemented with data collected using semi-structured interviews and analysis of secondary data from the logistics firm. The data is collected and analysed using a coding method based on the theory of planned behaviour.

SECTION 5 DECLARATION

I/we hereby agree that I/we have read the Buckingham Business School's Ethics Code of Practice and taken reasonable steps to ensure the independence and transparency of this research project. There are no significant conflicts of interest or partiality that may impact on the findings and outputs of my/our research activities.
I/we confirm that all participants will be recruited on the basis of informed consent.



SIGNED: DATE: 25 Jan 2015

PRINCIPAL RESEARCH INVESTIGATOR

SIGNED: DATE: 27th Jan 2015

SUPERVISOR (WHERE APPROPRIATE)

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Acronyms and glossary

3PL	3rd Party Logistics Provider
ATBV	Attitude and Time Based View: name of the conceptual framework developed in this research
CasComp	Case Company: the firm used in this research as the case study organisation
CM	Central Management: member of the central administrative control group
DISC score	Direction, Importance, Strength, Consistency (method used to analyse attitudes in the context of the ATBV framework)
EBIT	Earnings Before Interest and Tax.
ES	External source: data provided from someone external to the CasComp
GM	General Management: member of the firm general management group, but not part of Central Management group
LSP	Logistics Service Provider. Used as a synonym for a 3rd Party Logistics Provider
PSS	Product Service Systems
RBV	Resource Based View (also known as Resource Based Theory)
SCA	Sustainable Competitive Advantage
SCP	Structure Conduct Performance
TGF	Theory of the growth of the firm
TOF	Theory of the firm

1 Introduction

1.1 Introduction to the research

The only agreed-upon proposition we have today is that we do not have a commonly accepted theory to explain how and why firms behave as they do (Wernerfelt, 2016). This is not due to a lack of research. Some of the leading thinkers over the past century have attempted to develop theory to better understand firm-level behaviour (Barney, 1991; Chandler, 1962, 1992; Coase, 1937; Conner, 1991; Friedman, 1962; Grant, 1996; Grossman et al., 1986; Hart and Moore, 1990; Penrose, 1959) to name a few.

This research aims to contribute knowledge centred on understanding and explaining firm-level behaviour and performance. To do this, this research begins by proposing that firms can be investigated from four different theoretical perspectives: a macro, an economic, a strategic or an individual perspective. This research then argues that the most appropriate perspective from which to initiate an investigation into firm-level behaviour is that of a strategic perspective.

Viewed from this strategic perspective, this research then considers the Resource-based View (Barney; 1991, 2001, Wernerfelt 1984), a view that dominates strategic management literature (Halawi et al., 2005, Hoopes et al., 2003) and one that has become so embedded that it has even been described as timeless (Walker et al., 2015). The Resource-based View is increasingly accepted as a Resource-based Theory (Barney and Clark, 2007), and today the terms Resource-based View and Resource-based Theory are used interchangeably (Barney, 2001; Barney and Clark, 2007). For clarity, the term Resource-based View (RBV) is used in this research to refer to both.

The focus for many researchers has been on either enhancing, critiquing or even rebuffing the critiques towards RBV (Barny, 2001; Kraaijenbrink et al., 2010; Priem and Butler, 2003). This research takes an alternative approach; rather than adding to the plethora of discussions about the benefits and drawbacks of RBV, this research calls for a return to the Theory of the Growth of the Firm (TFG) (Penrose, 1959) as an alternative to RBV (Barney, 1991, 2001; Wernerfelt, 1984). As such, this research argues that TGF, rather than RBV, is the most appropriate theoretical lens through which to investigate and understand firm-level behaviour and performance.

The arguments laid out in this research run contrary to the views of researchers who argue that RBV (Barney, 1991, 2001; Wernerfelt, 1984) is an enhancement of TGF (Penrose, 1959) or even that TGF and RBV are one and the same thing (Mahoney and Pandian, 1992). Instead, this research agrees with Rugman and Verbeke (2002) that researchers should return to the original ideas of Penrose (1959), as her original ideas have not been fully understood by contemporary researchers and are therefore worthy of further research attention.

Although this research argues for a return to the key insights of TGF (Penrose, 1959), this research also identifies seven notable gaps in the theory. To address the gaps identified, this research develops a new conceptual framework entitled an Attitude and Time based view (ATBV) of the firm. This research proposes this new conceptual framework as an alternative to RBV and as a new and novel approach to investigate firm-level behaviour and performance through the lens of TGF.

The ATBV conceptual framework developed composes of two main components, that of Attitude and Time. Considering first the element of Time. Time is included in the conceptual framework based on one of the key insights derived from TGF (Penrose, 1959), namely that management capacity is the key resource within the firm (Penrose, 1959). This research restates Penrose's assertion that availability of management capacity is the key resource within the firm (Penrose, 1959) and specifies that availability of management time is the key resource available to the firm. This focus on management capacity or management time as the key resource within the firm differentiates research from other contemporary resource-based researchers such as Barney (2001) who focus on investigating a much wider range of tangible and intangible resources available to the firm.

Although this importance of understanding management time is derived from the ideas of Penrose (1959), the relative importance of management time is also highlighted by other leading strategic thinkers, one such example is Drucker (1967, pg 51), who states:

"time is the scarcest resource, and unless it is managed, nothing else can be managed"

More recently, Porter and Nohria (2018) provide research that aims to understand how management time allocation influences the overall performance of the firm. However, Porter and Nohria (2018) limit their research to understanding the time allocation of only the Chief Executive

Officer (CEO) of the firm, whereas this research extends the investigation to include all management time within the firm.

Thus, although evidence of research is found that highlights the importance of management time for firm-level investigation, scant evidence is found of theoretical developments into the investigation of management time and its influence on firm-level behaviour and firm-level performance. This research, and specifically the ATBV conceptual framework developed in this research, address this existing gap.

In addition to the construct of management time, which this thesis argues is the key resource available to the firm, the second key construct included in the ATBV conceptual framework is that of attitude. The decision to include attitude as a key construct is also derived from Penrose (1959), who states that a firm is simply a collection of individual human beings trying to do something. Such an insight moves the discussion away from conceptual economic theorising about the behaviour of firms into the more practical realm of understanding how and why a collection of human beings, organised as a firm, behave as they do. Although Penrose (1959) highlights the importance of individual behaviours and the influence they have on the overall behaviour of the firm, Penrose (1959) does not provide a means to examine such individual behaviours. This research addresses this gap by complementing TGF (Penrose, 1959) with elements from the theory of planned behaviour (Ajzen, 1991), a theory which posits that individual behaviours are mediated by individual attitudes towards carrying out certain planned behaviours. As such, attitudes, as well as time, are incorporated as the key constructs in the ATBV conceptual framework developed in this research. The two elements of attitude and time are combined within the ATBV framework and proposed as a means to investigate firm-level behaviour and performance.

The ATBV conceptual framework developed in this research draws on Penrose´s theory of the growth of the firm (1959) as the principal theoretical basis with which to understand firm-level behaviour, and complements TGF (Penrose, 1959) with elements from the theory of planned behaviour (Ajzen, 1991) to better understand the attitudes and behaviours of key individuals within the firm. This research identifies the key individuals within the firm as the central managers of the firm, a group identified by Penrose (1959) as the individuals within the firm who act as the court of last resort and define the firm-level strategy. The identification of this group of central managers allows a deeper investigation into the attitudes and behaviours of these specific individuals and

allows a deeper investigation into how central management attitudes influence, both positively and negatively, the behaviour of other managers in the firm, and ultimately the behaviour of the overall firm.

To summarise, the ATBV conceptual framework created in this research enables an investigation into

1) Management **attitudes,** and particularly the influence of central management attitudes in determining how all managers within the firm use their **time.**
2) The importance of management **time** as the key resource available to the firm and how the allocation of management time acts as a key determinant of overall **firm-level behaviour.**
3) How management **attitudes** influence how management **time** is used within the firm, and how a deeper understanding of how firms make use of management time can be used to investigate how firms **behave** as they seek to **grow**.

In terms of investigating attitudes, the theory of reasoned action (Fishbein and Ajzen, 1977) subsequently developed into the theory of planned behaviour (Ajzen, 1985, 1991) has been used extensively to understand consumer attitudes. However, it has not been widely used to evaluate management attitudes and decisions within the context of a firm-level decision making (Southey, 2011). This is mainly because management decision making is considered as multi-person, multi-departmental and multi-objective in nature (Southey, 2011).

To overcome this, this research develops a new and novel approach to applying the theory of planned behaviour (Ajzen, 1991) to understand management attitudes and behaviour in a business context. Specifically, this research creates a new DISC score to measure attitudes of managers within the firm, with the acronym DISC referring to the four dimensions of the attitudes measured; the Direction, the Importance, the Strength and the Consistency of the attitude. The DISC score is used in this research to measure central management attitudes towards pursuing certain productive opportunities available to the firm. The DISC score created in this research is novel, in that it considers three common constructs frequently employed when applying the theory of planned behaviour (Ajzen, 1991) to measure attitudes, that of the Direction, the Importance, and the Strength of the attitude. But, in addition to these three constructs, this research adds a fourth construct of Consistency. Consistency is added to consider the level of agreement, or

consistency of the attitudes held by central managers within the firm when considering whether to pursue certain productive opportunities available to the firm.

The specific focus of the ATBV conceptual framework on understanding firm-level growth is also worthy of note. The emphasis on growth further distinguishes Penrose (1959) and the ideas in this research from other contemporary resource-based researchers who focus more on the attainment of a sustainable competitive advantage and above-average economic rents as the desired outcome of firm-level behaviour (Barney, 2001; Wernerfelt, 1984). Instead, this research, in line with Penrose (1959), considers firm-level growth as the desired outcome of firm-level behaviour.

However, despite the importance of growth in TGF, the term growth is identified as an ambiguous concept within Penrose´s original theory of the growth of the firm (Penrose, 1959). Penrose (1959) does not provide clarity on how to measure firm-level growth, a difficulty that contemporary researchers such as Davidsson et al., (2006) continue to investigate. The new ATBV conceptual framework developed for this research aims to address this ambiguity and provide more clarity on how to measure firm-level growth. This research argues against using fixed assets or number of employees, and instead argues that firm-level growth should be measured from two perspectives; top-line revenue growth and bottom-line profit growth, and that each type of growth is also predicated on one hand, by how managers within the firm spend their time, and on the other, through mediation by the market.

Despite the principal aim of this research being to further develop and improve theoretical insight through the creation of the ATBV conceptual framework, it is not the aim of this research to develop a grand theory of the firm (Makadok et al., 2018). Instead, this research leans more towards developing a practically applicable theoretical framework, one which can be applied and tested to investigate and understand actual firm-level behaviour. Such an approach is in line with Lewin, who argues that “there is nothing so practical as a good theory” (Lewin, 1951, p169) Consequently, the focus of this research is on developing the ATBV theoretical framework so that it provides new insight and understanding of how firms actually behave, rather than aiming to understand how they should behave.

One of the attractions of the theory of the growth of the firm is that Penrose (1959) argues that no firm is limited to the product/service that it provides today, nor limited to remain in the market the

firm currently serves. Instead, Penrose (1959) argues that firms are only limited to the productive growth opportunities that the firm´s managers are able to identify and have the time and capability to exploit. Such thinking suggests that any firm could potentially diversify and develop any type of new productive opportunity in any new market. Such a broad perspective is one of the advantages of Penrose´s theory (1959) but such wide thinking also poses a challenge to researchers; if any firm can do anything, where does one start to research why firms do what they do?

Consequently, after developing the ATBV conceptual framework but before empirically testing it, this research first sets out three contextual boundaries for the application of the ATBV framework; Firstly, it sets a boundary in terms of the type of strategic change initiated by the firm, secondly in terms of the type of productive opportunity pursued by the firm, and thirdly in terms of the type of firm pursuing the productive opportunity.

In terms of the first contextual boundary, the ATBV conceptual framework is applied in the context of a specific type of strategic change initiated by the firm, that of a planned strategic change (Lesseure et al., 2010). This type of strategic change is selected as it is a planned, deliberate change, where managers within the firm elect to pursue the change, rather than it being imposed on the firm from external forces.

In terms of the second contextual boundary, the ATBV conceptual framework is considered to understand the rationale for pursuing a specific type of productive opportunity available to firms, that of developing a Product-Service System (PSS) business model (Goedkoop et al., 1999). The principal reason for selecting this particular productive opportunity as the contextual application for the ATBV framework is that the decision to develop a new PSS business model can be considered as a deliberate and planned strategic change for the firm (Lesseure et al., 2010) and also that for many firms, the development of a PSS is a diversification from its existing core business model. As such, understanding why a firm would elect to move from its current offering to a new PSS offering provides a useful contextual field in which to understand a change of firm-level behaviour through the application of the ATBV conceptual framework.

In terms of the third contextual boundary, that of specifying the type of firm pursuing the PSS business model, the ATBV conceptual framework is applied to understand the behaviour of a specific type of service firm, that of a Logistics Service Provider (LSP). The rationale for this is that most PSS research to date has sought to investigate the phenomenon of manufacturing firms

adding a service element to their existing manufacturing offering to create a PSS (Ahamed et al., 2013; Pal, 2016; Sassanelli, 2011). In contrast, researchers have largely ignored the alternative scenario of PSS productization strategies, in which a service firm seeks to develop a PSS by adding a tangible product to their existing service offering (Leoni; 2015, 2019).

Bringing the three contextual boundaries together, it can be summarised that this research aims to test the applicability of the ATBV conceptual framework to understand why an LSP would elect to move away from its core offering of providing logistics services in order to pursue a PSS productization strategy by means of a planned strategic change.

To empirically test the ATBV conceptual framework developed in this research, this research uses a two-year longitudinal case study approach with an LSP firm that seeks to move away from its core offering of providing pure logistics services to pursuing a new PSS productization strategy. It is by doing so that this research not only develops the ATBV conceptual framework but also tests its applicability in a novel contextual setting (namely that of understanding why an LSP firm would pursue a PSS productization strategies). This first application of the ATBV conceptual framework is proposed as a first step in using the ATBV conceptual framework to develop a broader theoretical understanding of firm-level behaviour that can then be applied in other contextual settings and for other types of firms.

To summarise, this research aims to contribute new knowledge first and foremost in the development of theory to understand firm-level behaviour. It does so by identifying gaps in the theory of the growth of the firm (Penrose, 1959) and addressing the gaps with the creation of a new ATBV conceptual framework. As well as developing this conceptual framework, this research also applies and tests the ATBV conceptual framework with a case study of an LSP seeking to develop a PSS productization strategy by means of a planned strategic change.

To ensure that the ideas outlined in the above introduction are fully addressed, the next section sets out two specific research questions that this research aims to answer.

1.2 Research aims and research questions

The overall aim of this research is to increase understanding of the behaviour of firms. Specifically, it aims to challenge the widely applied Resource-based View (Barney, 1991; Wernerfelt, 1984) and instead question whether the theory of the growth of the firm (Penrose, 1959) is in fact a more appropriate theoretical lens than RBV to investigate firm-level behaviour. To address this question, this research sets out RQ1 as follows:

RQ1: How does the theory of the growth of the firm (Penrose, 1959) explain the behaviour of a firm that seeks to grow?

It is in investigating RQ1 for this research, that several gaps are identified in the theory of the growth of the firm (Penrose, 1959). To address the identified gaps, this research develops the theory of the growth of the firm (Penrose, 1959) into a new conceptual framework which focuses on understanding management attitudes and management time allocation as a means to investigate the behaviour of firms that seek to grow. To apply and test the conceptual framework developed, this research sets out RQ2 as follows:

RQ2: How do management attitudes and management time allocation influence the behaviour of a firm that seeks to grow?

To facilitate reader orientation as to how these research questions are addressed, the next subsection lays out the structure for the remainder of this research. The following section is considered of importance, as this research does not follow the standard PhD structure (White, 2011). In fact, it is considered necessary to point to Penrose's advice when laying out her own theory of the growth of the firm (Penrose, 1959, preface xlviii):

> *"the reader is encouraged to read the research in the order in which it is written, as the entire study is essentially a single argument no step of which can be omitted without the risk of misunderstanding later conclusions"*

Readers of this research are equally advised to follow this suggestion.

1.3 Thesis structure

Research is often convoluted, intermittent and non-linear (Wells and Nieuwenhuis, 2017). Thus, to write up research in the order in which it was carried out can be problematic for readers to follow. Therefore, although a number of research frameworks (Bryman and Bell, 2011; Creswell, 2009; Saunders et al., 2012; Watson, 1994) were drawn upon to complete this research, the research is written using a reader-centric approach (White, 2011). A reader-centric approach indicates that the research is written in such an order to provide the reader with a logical flow of the findings generated from the research, even if this is not fully reflective of the order in which they were discovered.

The structure of this research also draws on the structure used by Wernerfelt (2016) in developing adaption cost theory. In this, Wernerfelt (2016) develops a new theoretical position based on existing theoretical knowledge then tests and applies the new theoretical position with empirical data to draw conclusions about the suitability and relevance of the theoretical position adopted. This research follows a similar logic and structure.

Like Wernerfelt (2016), this research begins with a chapter dedicated to reviewing and critiquing existing literature related to theories of the firm. As such, the next chapter, chapter 2 centres mainly on RQ1 and begins with a broad overview of different theoretical perspectives that could be used to investigate firm-level behaviour. After considering four different theoretical perspectives, the research focuses on the strategic perspective and considers both RBV (Barney, 2001, Wernerfelt, 1984) and the theory of the growth of the firm (Penrose, 1959) as alternative theories to investigate firm-level behaviour. The chapter argues that the theory of the growth of the firm (Penrose, 1959) is the most appropriate theoretical basis to understand firm-level behaviour and performance. The chapter returns to the original theory developed by Penrose (1959) and seeks to discover and highlight any gaps. The chapter concludes with an overview of the gaps that remain unresolved in the theory of the growth of the firm (Penrose, 1959).

Chapter 3 seeks to begin to address these identified theoretical gaps in the theory of the growth of the firm (Penrose, 1959). The chapter proposes a new conceptual framework that combines ideas from the theory of the growth of the firm (Penrose, 1959) with ideas from the theory of planned behaviour (Ajzen, 1991) as a means to improve understanding as to why a firm would diversify away from its core offering to pursue a new productive opportunity to achieve growth.

The new conceptual framework developed in the chapter is the Attitude and Time Based View (ATBV) of the firm. One of the proposed advantages of the theory of the growth of the firm (Penrose, 1959) and the subsequent ATBV conceptual framework built from it in this research, is generalisability; The ATBV conceptual framework can be applied to any firm looking to grow and develop in any direction. Such a broad proposition is advantageous from a theoretical perspective as it facilitates a high degree of generalisation. However, from a practical research perspective, the breadth of applicability of the ATBV conceptual framework provides a challenge to set the boundaries of the research in this research.

To overcome this challenge, chapter 4 specifies the contextual boundaries of this research, and provides a contextual situation in which to apply and test the ATBV conceptual framework and allow for RQ2 to be addressed. The chapter considers different types of change available to firms and selects a planned strategic change as a contextual boundary to test the ATBV conceptual framework. The chapter goes on to propose one specific type of productive opportunity that a firm may seek to pursue as a planned strategic change, that of the development of a Product Service System (PSS) business model (Goedkoop et al., 1999). This chapter provides the rationale for the selection of PSS as the contextual field in which to apply and test the newly developed ATBV conceptual framework. The chapter provides a broad introduction to PSS and highlights that although an abundance of research exists related to firms developing a PSS through a servitization strategy (where firms add a service element to an existing product), there is limited research about the alternative possibility of a firm developing a PSS through a productization strategy (where a firm adds a tangible product to an existing service). This lack of research and understanding as to why a service firm may elect to pursue a productization strategy to achieve a PSS thus provides an attractive opportunity to apply the ATBV conceptual framework and test its applicability to increase understanding of firm-level behaviour. The chapter concludes with a section which considers existing literature related to the potential for logistics service firms in particular to develop PSS business models. It does so to demonstrate that such a strategy is rare but potentially attractive to logistics firms, particularly as new production technologies such as additive manufacturing continue to reduce the barriers to service firms pursuing new PSS productization strategies.

Due consideration was given as to whether the contextual setting, as laid out in chapter 4 above should appear before or after the chapter laying out the research methodology for this research in chapter 5. It was elected to provide details of the contextual setting before the research

methodology, as the information for the contextual setting in chapter 4 was principally derived from existing literature, rather than empirical data collection. Furthermore, specifying the contextual boundaries in chapter 4 allowed a more specific and carefully designed research methodology to be developed, as laid out in chapter 5.

Chapter 5 then contains the research methodology used in this research to empirically test the ATBV conceptual framework developed in chapter 3. The chapter considers three different research methodologies that could have been used in this research before electing to use a 2-year longitudinal single case study methodology to address the research questions. The rationale for this selection and the inherent limitations of the methodology selected are also provided in this chapter, as well as the steps taken to mitigate any potential limitations in terms of research quality and ethics.

Chapter 6 provides the principal findings generated as a result of this research. It does so from the testing and application of the ATBV conceptual framework in line with the case study methodology developed in chapter 5. The chapter principally addresses RQ2 and provides the key data and analysis generated from applying the ATBV conceptual framework in the longitudinal case study.

With the ATBV conceptual framework applied, chapter 7 provides the conclusion drawn from the testing and application of the framework. The first section of chapter 7 returns to the specific research questions set out at the start of this research (RQ1 and RQ2) and brings together all of the theoretical knowledge and practical insight derived from the data and analysis to specifically answer the research questions set out in this research and specify the areas of knowledge developed in this research. The next section of chapter 7 provides an overview of the practical and management implication of the knowledge generated from this research. The third section of the chapter provides an overview of the limitations identified in this research. The fourth and final section of chapter 7 is dedicated to suggesting areas of future research to further develop the knowledge created in this research.

This section has provided the structure of the remainder of the research. Before providing the content, it is considered necessary to make a comment related to the spelling system used throughout the remainder of the research. Throughout this research, the UK spelling system is used, meaning for example that the UK spelling of “realise” and “colour” are preferred to the US

spellings “realize” and “color”. However, over the course of the research, certain words were identified that were more frequently used in academic journals (both UK and US based) with the US spelling of a term rather than the UK version. One such example is the term “productization” (US spelling), which was much more frequently used by researchers than the UK equivalent “productisation”. Therefore, for certain specific terms, namely “productization” and “servitization”, the US spelling is adopted due to its widely accepted use in academic journals.

2 Literature Review: Theories of the firm

2.1 Chapter introduction

As this research is primarily focused on contributing new theoretical knowledge, this chapter first provides a wide review of existing theoretical knowledge related to theories of the firm. The chapter is organised as follows: In the first section, the term “theory” is defined and the rationale for exploring and developing theory within this research is presented. The second section lays out four different theoretical perspectives through which firms can be investigated. The aim of this section is to broadly consider different theoretical perspectives that can be used to investigate firms, and then explore the appropriateness of these different theoretical perspectives to research different firm related questions. From this wider theoretical review, it is argued that a strategic perspective is the most appropriate theoretical perspective to understand the behaviour of firms. With this decided, the chapter explores two different theories, that of the Theory of the Growth of the Firm (TGF) (Penrose, 1959) and the Resource-based View (RBV) (Barney, 1991; Wernerfelt, 1984) with a view to understanding the differences between the two and select which is the most appropriate theoretical lens to address the research questions set out in this research.

It is also noted that some researchers consider TGF and RBV to be one and the same thing (Mahoney and Pandian, 1992). This research rejects this view. Instead, this research begins by highlighting the differences between RBV and TGF. It then explores contemporary critiques of RBV and asks whether TGF rather than RBV is a more appropriate theoretical basis to address the questions set out in this research. The exercise concludes that TGF is a more appropriate theoretical lens to address the questions in this research, and thus the section continues with a deeper exploration and understanding of the key ideas developed in TGF. The exploration concludes with a summary of contemporary thinking on TGF and also the identification of several gaps in TGF.

It is these identified gaps in existing theoretical knowledge related to TGF that are then used as a basis for the development of a newly proposed conceptual framework, the Attitude and Time Based View (ATBV) of the firm, which is developed in the subsequent chapter. But the first step in building the theoretical foundations for this research is defining what a theory is.

2.2 Defining theory

There is no unified agreement on what constitutes a theory; Schmenner and Swink (1998) argue that five criteria must be met for something to be considered a theory. First, that the phenomenon for which explanation is sought should be clearly and unambiguously defined. Second, that the phenomenon should be derived either logically or empirically from observed regularities. Third, that these regularities should be translated into laws which should then ideally be translated into mathematical statements. Fourth, that the theory should include a mechanism that explains why the laws work as they do and explain any limitations that the laws are subject to. And finally, that the power of the theory can be measured by its ability to unify various laws and also generate predictions or implications that can be tested by data.

These stringent criteria for what constitute a theory, with an emphasis on working towards the development of empirical proofs and mathematical laws, contrast with the views of Walker et al., (2015). Walker et al., (2015) argue that a theory is something that simply helps to make sense of the complex world around us and that a theory must serve a function beyond simple description to enable predictions associated to the relationships between phenomena.

Porter (1991) does not reject the positions of either Schmenner and Swink (1998) nor those of Walker et al., (2015). Instead, Porter (1991) argues that theory can be developed through stringent mathematical models or from the creation of conceptual frameworks, whereby the former provide high level of rigour and precision, and the latter are useful to illustrate a broader range of variables and ideas.

Similar to Porter (1991), Whetten (1989) provides a criterion for theory that fits between these two positions of Schmenner and Swink (1998) and Walker et al., (2015). Whetten (1989) argues that a theory should contain four essential elements: First, identification of the factors (variables, constructs, concepts) to be considered as part of the explanation of the phenomena. Second, the theory should explain how the factors are related. Thirdly, the theory should include why these factors are related as they are – in other words, the underlying dynamics that justify the selection of the factors and their proposed relationships. Lastly, the theory should explain when to whom and where the theory is applicable. It is Whetten's (1989) criterion for theory that is drawn upon in this research and, from this criterion, the following definition of theory is used in this research:

“A theory brings together different factors and their associated relationship to explain the underlying dynamics of a specified contextual phenomenon in order to enable predictive capabilities”

Even with the term theory defined, it is recognised that ambiguity can remain with other words closely associated with the term theory. Terms such as frameworks, models, concepts, perspectives and constructs are frequently used in conjunction with theory (Porter, 1991). In this research, the term conceptual framework is frequently used in relation to theory, hence an explanation of the term conceptual framework is provided next.

The term concept is defined as a component of theory which conveys an abstract idea within a theory (Chinn and Kramer, 1983) and the term framework refers to a guide that frames the research questions and methods and helps to fine-tune the data analysis (Imenda, 2014).

A conceptual framework therefore differs from a theoretical framework, in that the latter relates to one specific theory, whereas the former may draw on multiple theories, concepts and empirical findings and thus a conceptual framework can best be described as an integrated way of looking at a problem (Imenda, 2014).

With the terms theory and conceptual framework defined, it is possible to return to the question of whether theory is needed for this research. Hambrick (2007) argues that today’s researchers suffer from “theory fetish” and place excessive focus on theory and theory development at the expense of researching, understanding and revealing interesting phenomena. Makadok et al., (2018) argue that for many researchers, their theoretical contributions are more about extending, clarifying or apply received theories in new and interesting ways rather than aiming to create new theories or “grand theory” paradigms.

Despite Hambrick’s (2007) view that the importance of theory is overstated, it is argued in this research that a strong theoretical foundation is needed for this research for two fundamental reasons. The first is related to the initial objective laid out at the start of this research which specified that the overall aim of this research is to make a contribution to knowledge. To contribute new knowledge, an understanding of existing knowledge must be considered, as it is existing knowledge that constitutes the foundations on which any new knowledge is added. Thus, a section on theory is required to bring together existing knowledge that underpins contextual

knowledge about any one subject. The second reason why a theoretical perspective is required in this research is that it is recognised that different people observing the same event are likely to come up with different interpretations of the same event (Imenda, 2014). The different theoretical "lenses" through which each individual observes and interprets the world has an impact, not only on what is seen but also on what is looked for. As a consequence, a robust consideration of the theoretical foundations for any research is required to provide transparency on the lens through which any research has been carried out. It is with the importance of theories in mind that the following section begins with a review of a wide range of theoretical perspectives, before focusing on a select number of appropriate theories for this research.

The dictionary of theories (Bothamley, 1993) defines over 5000 recognised theories. Of course, most are not relevant for research related to firms, so the first step is to identify those families of theories that are most relevant and useful for the research questions set out, which in the case of this research are those theories which relate to firms.

2.3 An introduction to theories of the firm.

There is no single, unified theory of the firm (Penrose, 1959; Wernerfelt, 2016) and instead, it is more appropriate to refer to the theories of the firm (Grant, 1996) rather than to any single overarching theory. As such, this research first explores several different theoretical perspectives related to the firm, rather than selecting any one theory of the firm from the outset.

One can argue that there will never be one single unified theory of the firm due to two fundamental reasons. Firstly, because of the wide range of questions that can be asked about firms (Penrose, 1959; Porter, 1991; Teece et al., 1997; Wernerfelt 2016) and secondly that the questions asked about firms can be approached through many different perspectives, including sociological, legal, organisational, engineering or economic (Penrose, 1959) or even from an interdisciplinary perspective (Shafritz et al., 2015).

Thus, a useful place to begin exploring different firm-level theories is to investigate the research questions used by key authors when developing theories related to firms. A review of the literature identifies a plethora of questions that can be raised related to firms; Teece et al. (1997) propose that the key questions to be investigated are: how do firms get to be good, how do they sometimes

stay good, how and why do they improve and why do some firms decline? Wernerfelt (2016) complements this with more fundamental questions such as why do firms exist? What is a firm? Who sets the direction of the firm and what is the purpose of the firm? Looking from a more strategic perspective, Porter (1991) argues that there is only one key question related to firms; why do firms succeed or fail? From a similar strategic perspective, Rumelt et al., (1995) argue that there are four fundamental questions related to firms: How do firms behave? Why are firms different? What is the function of, or value added by, the headquarters unit in a multi-business firm? And, what determines the success of failure of the firm in international competition?

With such a range of questions about firms available, it is first useful to take one step back and aim to group the questions into different theoretical perspectives. Teece et al., (1997) argue that there are two different theoretical perspectives with which to investigate firms, either an "economising" perspective, which seeks to understand the behaviour of firms within the context of the wider economy. Or, an alternative "strategizing" perspective which seeks to understand the behaviour and performance of individual firms within a market environment. To these two perspectives identified by Teece et al., (1997), two other perspectives are identified from the literature. The first is referred to here as the "macro" perspective, in which one aims to understand the role of firms within wider society and the wider natural environment (Elkington, 1998). Another perspective is that highlighted by Foss et al., (2008) which the authors refer to as a "subjective" perspective. This subjective perspective focuses more on the behaviour of individuals within a firm and the mental models used by those individuals within the firm. This perspective is referred to in this research as an "individual" level perspective. These four theoretical perspectives identified from the literature are named in this research as a macro, economic, strategic and individual perspective. The four perspectives are visualised in Figure 1.

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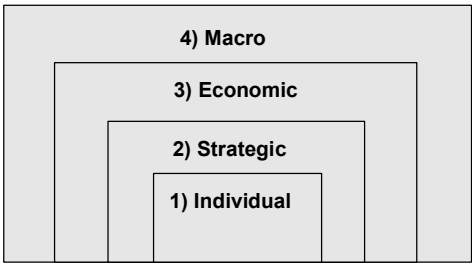


Figure 1 : Possible theoretical perspectives for investigating firms (created by author)

The four perspectives in Figure 1 are shown as nested, as one can argue that firm related theory builds upwards from individual to macro level theory. This implies starting at the base and first aiming to understand how and why individuals work together to create firms, then how and why firms pursue certain strategies, then how these firms compete within a market economy, and lastly the role that these groups of firms play in wider society, *vis-à-vis* other institutions and also their interaction on the natural environment (Dawkins and Lewis, 2003).

It is equally plausible to think from the other direction, and start at the top to first aim to understand the role of firms from a macro perspective, and specifically a firm´s macro level of responsibility towards profit, people and planet Elkington (1998) and then work downwards to the individual perspective to understand why individuals elect to work for or buy from different firms.

It is also recognised that there is no clear divide between the four different perspectives, and often researchers move across one or more of the different perspectives. As an example of this, it can be argued that what Teece et al., (1997) refer to as "economizing" implies starting from an economic perspective and researching down to a strategic perspective, and what Teece et al., (1997) refer to as "strategizing" refers to starting at a strategic perspective and working upwards towards an economic perspective. Foss et al., (2008) also advocate working across perspectives, arguing for a need to bridge the thinking between the two perspectives of individual and strategic. Such examples highlight the importance for researchers to think across the four boundaries of the different perspectives identified.

Dispute a blurring of the lines between the four different perspectives, organising the theories into these four different perspectives does provide a useful means to group the different questions related to firms from authors such as Rumelt et al., (1995) and Wernerfelt (2016). Table 1 provides a summary of the four theoretical perspectives identified in the literature and provides examples of the types of research questions that are typically addressed within each of these theoretical perspectives.

Theoretical Perspective	Example questions investigated
Macro	- What is the role of firms in wider society? - Do firms have a responsibility beyond profit?

Economic	- Why are firms created? - What forces control and limit the size and behaviour of firms?
Strategy	- Why do some firms succeed and some firms fail? - How do firms behave? - Why do certain firms behave in certain ways? - What internal and external factors influence firm-level behaviour?
Individual	- How do individuals within firms influence firm direction and behaviour? - What internal and external factors influence the decisions and behaviour of individuals within the firm?

Table 1 : Different theoretical perspectives and examples of firm related questions that they address

In the following section, each of these four perspectives is considered in more detail, with a section on each laying out a high-level overview of the key theoretical developments that have been created under each perspective. The aim of the following sections is to provide a wide review of different theoretical perspectives related to firms and to use this broad review as a means to select the most appropriate theoretical perspective or perspectives to be used as a theoretical foundation for this research.

2.4 Theories of the firm from a macro perspective.

A macro level perspective can be used to address the fundamental questions related to the role and purpose of firms within wider society and nature. Although it is tempting to assume that the sole purpose of firms is to generate profits for their owners (Friedman, 1970), such an assumption overlooks a number of key questions about the role of firms in society, their role in the wider natural environment (Elkington, 1998) and their level of interaction with other institutions (Moran and Ghoshal, 1999). Such thinking about interactions and interconnectivity between firms and other institutions lends itself well to the use of systems theories such as those developed by Senge (2006).

Despite this, early theory related to firms came predominantly from economic minded thinkers such as Coase (1937). However, the notion that firms have a responsibility beyond profits and economics is not new; Carroll (1999) provides evidence that the idea can be traced back to the 1940s and the work of authors such as Krops (1940) and Davis (1960).

Research by Chang et al., (2017) further demonstrates that the theoretical landscape related to firms can be considered beyond economics. Chang et al., (2017) point out that firms can be investigated from a social, environmental and economic dimension. Chandler (1992) adds an additional dimension, arguing that firms are simply the most efficient means of introducing and deploying new innovations and ideas across society. This view is also reflected by Butler (2012), who points to the ideas of Adam Smith (Smith, 1887), and specifically Smith´s pin analogy, to argue that the societal purpose of firms is to allow individuals to work collectively within a firm to produce more than the sum of their parts.

Smith's (1887) work was founded on the assumption that firms are created for the collective social good and that firms provide a positive contribution to the wider world by combining skills and knowledge in an efficient way. This view is similar to that of the view collectively known as the Chicago perspective (Conner, 1991). The Chicago perspective argues that firms are inherently positive for society in that that the purpose of firms is to bring together individuals into organisations, and that the firm, with the motivation to maximise profits by combining production and distribution of goods, is a precursor for improved overall societal efficiency and ongoing development and improvement of society (Conner, 1991). An alternate theory, popularised by Bain (1954) and underpinned with a Structure-Conduct-Performance (SCP) framework (Lee, 2007), holds the alterative assumption that firms are inherently negative for society and need to be controlled by governments. Using the SCP framework, the authors argue that firms do not operate in a situation of perfect competition framework and that firms exist to restrain productive output by looking to achieve and exercise monopoly powers by colluding with other firms to restrain access to goods and services, therefore pushing up market costs, and allowing firms to generate profit (Conner, 1991).

Conner (1991) goes on to state that the firm's ultimate objective is to generate above-normal financial returns. Similarly, Friedman (1970) explicitly makes the point that the only purpose of firms is to make a profit, and that any firm that aims to be acting in the name of social or environmental responsibility is delusional. In line with this, McWilliams and Siegel (2001) argue that when managers within a firm pursue anything beyond firm profit, there is an agency conflict (Eisenhardt, 1989; McWilliams and Siegel, 2001) as managers are working on things that are not in the interest of firm owners. The alternative view, provided by Elkington (1998), argues that firms do not exist just to generate profits, but also have a wider responsibility to care for both wider society and the natural environment. Similarly, Schumacher (1973) challenges the notion that

firms must pursue growth for growth's sake and argues that the primary purpose of firms is to create meaningful work for people. Today, questions around the purpose of firms within the context of the wider societal and natural environment continue to be discussed, with even the CEOs of major firms calling for an end to the statement that the primary purpose of firms is to create profit for shareholders (Murray, 2019).

This section has introduced the idea that the wider purpose of firms is still subject to debate and that it cannot simply be assumed that firm-level behaviour can be explained purely in terms of profit motive and economic rationale (Penrose, 1959). In fact, this section has highlighted that firms can be considered from many different perspectives that go way beyond profit, and as such, macro level theoretical perspectives can be a useful perspective with which to investigate firms, in particular in terms of their interaction with society, other institutions and the wider natural environment. That said, economic theory dominated early thinking that sought to explain the behaviour of firms (Shafritz et al., 2015) and it is theories of firms developed from an economic perspective that are considered in the following section.

2.5 Theories of the firm from an economics perspective.

Whereas theories of the firm from a macro perspective aim to explain the role and purpose of firms within a wider socio-economic system, theories of the firm from an economics perspective aim to explain how firms interact within the context of the market (Jensen and Meckling, 1976). In fact, Jensen and Meckling (1976) argue that when economists refer to the “theory of the firm”, the material provided is often not a theory of the firm *per se*, but rather a theory of markets in which firms are an important actor.

An economics-based perspective of the firm has also been used to explain why firms exist at all. Coase (1937) argues that the creation of firms can be best understood in terms of property rights and contract efficiencies. Coase (1937) argues that a clear definition of property rights is the basis for a functioning free-market economy in which firms exist to minimise transactional costs among individuals. As such, Coase (1937) argues that firms exist to reduce the costs and inefficiencies of contracting between many individuals. Specifically, that the economic cost for each individual consumer to negotiate contracts with multiple suppliers is minimised through the existence of firms, who perform the role of reducing the number of contract transactions.

The ideas of Coase (1937) were developed further and broadly integrated into contract theory, also known as property rights theory or Grossman-Hart-Moore theory (Grossman et al., 1986). From this theoretical perspective, the authors argue that the scope of firms is dictated by their level of integration or non-integration with other firms. This level of integration is itself dependent on how the rights of control of an asset are allocated between firms, and that the rights of control are the key driver to the *ex-ante* efficiency of each firm. Grossman et al., (1986) argue that it is impossible to contractually agree every transaction between two firms and that there is an inevitable incompleteness of each contract. It is this level of incompleteness which has an impact on rights of control over assets, which ultimately determines the efficiency and scope of any one firm.

Wernerfelt´s (2016) development of Adaption Cost Theory provides an alternative view to the Grossman-Hart-Moore's Property Rights Theory. Adoption Cost Theory proposes that employees and not assets are the defining factor for a firm and that the decision to hire employees is made by entrepreneurs who select to directly employ workers (creating a firm) as an alternative to buying specific services from the market, which incur high adaption costs. As such, whereas Grossman-Hart-Moore argue that a firm and its scope are defined by a set of co-owned assets, Wernerfelt (2016) proposes that the scope of the firm is defined by the employment relationship and the number of workers employed directly by an entrepreneur. More succinctly put, whereas Grossman et al., (1986) propose that "I am the boss because I own the asset", Wernerfelt (2016) argues that it should rather be stated that "I own the asset, therefore I am the boss".

A frequent component of economic-based theories of the firm is the notion of equilibrium (Rafferty, 1999), which implies that firms are competing within a market and that the gain of one firm implies a loss by another firm. It is at this point that the macro perspective discussed in the previous section begins to overlap with the economics perspective discussed in this section. For example, Friedman´s view (Friedman, 1970) that the sole purpose of firms is to generate profit, is founded on the notion that firms work within a self-policing economic market mechanism that ensures that competition remains between firms so that no one company can exploit their position to obtain excessive profits. This traditional neoclassic perfect competition theory argues that the size and scope of firms are maintained through classic economic price mechanisms operating in a perfect competition framework. The other argument, proposed by Bain (1954) is that markets and

economics alone cannot control firm expansion and that governments controls are needed to limit the dominance by any one firm.

It can be questioned whether economics alone is sufficient to understand the behaviour and performance of firms. Research by Geroski (2002) for example highlights the difficulty of using economic models to predict firm-level performance. Following an attempt to test different theories of the firm using different mathematical models, Geroski (2002) concludes that very little in the theory of the firm is mathematically testable and that firm performance is random and unpredictable. Moore (1992) proposes that the challenge for economists today is even greater than developing models to predict firm-level behaviour. According to Moore (1992), the more profound challenge is to even identify the forces that determine whether transactions are conducted within the firm or through the market.

Teece et al., (1997) argue that there is a clear distinction between theories of the firm generated from an economic perspective and theories of the firm that are based on a strategic perspective. Teece et al., (1997) propose that whereas theories of the firm from an economics perspective start with seeking to understand the performance and limitation of firms within the context of the economic markets in which the firm operates, theories of the firm from a strategy perspective often begin with an understanding of the decisions of the firm and how the firm can influence (and be influenced by) the market in which the firm operates.

This distinction between an economics and a strategic perspective is also highlighted by Porter (1981). Porter (1981) argues that theories based on an underlying SCP framework aim to understand first the Structure of the industry (an economics perspective), rather than starting with the Conduct of any individual firm (a strategy perspective). As such, researchers viewing firms through the lens of the SCP framework are often looking to understand the behaviour of firms within the context of the performance of multiple firms within an entire industry. From this, the aim is often to understand what influence the Structure of the industry has on the behaviour of firms (the Conduct), and how that structure can affect behaviours and subsequently the overall result (the Performance) of the industry.

In this sense, economic-based researchers viewing firms through the lens of the SCP framework are less interested in the good or bad performance of any individual firm, and more focused on the net effect of industry performance which is made up of a mixture of high and low performing

firms. This economic-based perspective can be contrasted with a strategic basic perspective, in which the individual behaviour of one firm is used as the start point for the investigation rather than starting from the Structure of the industry in which the firm operates. It is this strategic perspective that is explored in more detail in the following section.

2.6 Theories of the firm from a strategy perspective.

Penrose (1959) challenged the views of researchers such as Bain (1954) and Coase (1937) that firms should be researched purely as an economic entity. Instead, Penrose (1959) argued against the idea that firms were a simple product of economic inputs and outputs and stressed the importance of management decision making and management´s influence on the behaviour and direction of the firm.

Although the term “strategy” is only used twice in her seminal book, The Theory of the Growth of the Firm (Penrose, 1959), the ideas proposed by Penrose (1959) form the basis for the now flourishing literature on strategic theory development (Pitelis, foreword to Penrose, 2009). In fact, at the time that Penrose published the theory of the growth of the firm (Penrose, 1959), the use of the term strategy in a business context was rare (Freedman, 2015).

The use of the term strategy in a business context started to take off in the 1970s and today, the term strategy is frequently used in a business sense to refer to the plans and policies of firms (Freedman, 2015). Today the term strategy is almost ubiquitous in business literature. Despite, or perhaps because of its ubiquity, there is no one universally agreed-upon definition of the term strategy today (Freedman, 2015). However, Chandler (1962) provides an early and still widely used definition, specifying that firm strategy relates to the determination of and courses of action and allocation of resources that lead to the achievement of long-term firm-level objectives and goals. Such a definition implies that firms set long term strategies and then seek to allocate resources to realise the strategies to achieve certain long-term objectives.

An alternative view as to how firms create strategies is that of Mintzberg and Waters (1985). Mintzberg and Waters (1985) argue against the idea that firms have a deliberate and clear strategy and then focus on delivering it. Instead, Mintzberg and Waters (1985) argue that firms strategies emerge and develop in response to new internal and external factors. Such a view is

taken even further by Isenberg (1987) who argues that most firm strategies are opportunistic, whereby multiple decisions are made over a long period of time and are often adjusted as new ideas or opportunities arise, and that over time these multiple decisions collectively form the strategy of the firm.

It is widely accepted that developing an appropriate firm-level strategy, either deliberate, emergent or opportunistic, requires firms to consider both the internal strengths and weaknesses of the firm as well as the opportunities and constraints of the external environment (Andrews, 1971; Ansoff, 1957; Chandler, 1962; Child, 1972; Lawrence and Lorsch, 1986; Peng and Heath, 1996; Porter, 1980). Hoskisson et al., (1999) argue that strategic management researchers have tended to swing from a focus on either the internal or the external factors influencing firms. Hoskisson et al. (1999) argue that an emphasis on the internal strategic perspectives of the firm was led by authors such as Penrose (1959) and Ansoff (1957) and that this reflected at the time a change of focus away from the external, more economic emphases that were popular with economists such as Bain (1968), Coase (1937) and Mason (1939). Hoskisson et al., (1999) also point out that subsequent authors, particularly Porter (1979), reversed this trend, placing again the emphasis on external factors through the development of the five forces concept (Porter, 1979).

Despite recognising the importance of both internal and external factors, Penrose (1959) strongly argues that the internal perspective of the firm should be the start point for the analysis to understand the behaviour of the firm (Lockett, 2005). This differs from more economic-based researchers, such as Bain (1954), who start from the structure of the market in which the firm operates. According to Penrose (1959), the way that the firm interprets its external environment is determined by the internal resources and personal perspectives of the managers within the firm. This focus on the internal perspective of the firm, rather than the external market conditions marks a clear distinction with the ideas of other important strategic researchers such as Porter, who begin with an outside-in perspective (Porter, 1979).

Since its development, TGF (Penrose, 1959) as a strategic level theory has not so much been challenged, but rather enhanced, refined and influenced a number of strategy related theories (Pitelis, foreword to Penrose, 2009). In particular, TGF is often cited as key to the development of the resource-based view of the firm (Barney, 1991; Wernerfelt, 1984, 2016), the knowledge-

based theory of the firm (Alavi and Leidner, 2001; Grant, 1996) and the behavioural theory of the firm (Cyert and March, 1963; Pitelis, 2007).

In particular, Penrose's (1959) initial ideas were popularised and further developed by Wernerfelt (1984) and Barney (1991) who collectively developed what is referred to as the Resource-based View (RBV) of the firm. Although many considered Wernerfelt's paper in 1984 as a generalisation of Penrose's theory of the growth of the firm (Penrose, 1959), Wernerferlt (2016) states that this was not the case and that in fact, the development of the RBV in 1984 was a reaction to Michael Porter's five forces analysis (Porter, 1980) rather than an attempt to expand on Penrose's (1959) theory.

Wernerfelt (1984) does credit Penrose (1959) with the idea of looking at firms as a broader set of resources than traditional economists had done in the past. Further to Wernerfelt (1984), the resource-based view was developed and popularized by Barney (1991) who argued that a firm can achieve above-normal returns if the resources and capabilities that the firm controls are Valuable, Rare, Inimitable, Not substitutable, and that the Organisation is in place to absorb and exploit them (VRIN/O) (Kraaijenbrink et al., 2010). Barney's (1991) insight also differed from the historical economic views of Coase (1937) by identifying that capabilities and knowledge, as well as traditional economic resources such as land, capital and contracts, can be the source of competitive advantage.

In addition to placing the emphasis on the internal perspectives of the firm, another major contribution provided by Penrose (1959) is the notion that looking for opportunities outside of the firm's existing capabilities is a trade-off, and that firms must decide whether to focus their resources and management time on exploiting existing internal strengths or looking beyond existing internal capabilities to explore new productive opportunities. This trade-off between exploiting existing internal capabilities and exploring and developing new productive opportunities is often referred to as the Penrose effect (Tan and Mahoney, 2005) or the "fundamental ratio", or the "Edith's Effect" (Connell, 2007). This trade-off concept is also developed by Wernerfelt (1984), who argues that firms need to strike a balance between exploiting existing resources and developing new ones to generate profit by taking advantage of imperfect market conditions. This trade-off and desire to find the right balance between exploitation of existing resource and the development of new capabilities also forms the foundations for the notion of "ambidextrous" firms (Duncan, 1976), a notion which is explored in more detail in later sections of this research.

Returning to the exploration side of the trade-off and the search for new productive opportunities outside of the firm, Penrose (1959) makes an important distinction between the “objective” productive opportunity of the firm, which is limited to what the firm is able to achieve, and the subjective productive opportunity which is what the firm thinks it can achieve. Thus, for Penrose (1959), the interpretation of the external environment is the key determinant of management decisions towards the selection of new productive opportunities, rather than any objective facts about the external environment that an economist may observe (Connell, 2007). Such a view suggests that a deeper understanding of how managers subjectively interpret the external productive opportunities available is key to understanding how individual managers, and then collective managers working together within a firm, decide to pursue certain new productive opportunities.

Resource-based theories developed by authors such as Barney (1991) and Wernerfelt (1984) make no direct attempt to understand these individual subjective interpretations and their influence on management decision making about which productive opportunities the firm should pursue. Instead, RBV researchers consider the firm as one unified unit, and when they refer to “the firm” it is as if it were an entity in itself. In contrast to this, Penrose (1959) does recognise the importance of the subjective interpretations of managers within the firm and the influence of these individual interpretations on the direction of the firm. However, although Penrose (1959) recognises the importance of these individual subjective interpretations, she describes them as slippery concepts that are closely associated with the temperament and personal qualities of individuals, and as a consequence, they are very difficult to research (Penrose, 1959).

As such, it can be argued that resource-based researchers such as Barney (1991) and Wernerfelt (1984) do not attempt to understand individual-level management decisions and their influence on the overall behaviour of the firm and only consider the firm as one single unit of analysis. In contrast, Penrose (1959) does recognise that firms are made of individuals and recognises the importance of individual decisions and behaviours that eventually contribute to the behaviour of the overall firm. That said, Penrose (1959) does not seek to provide a theory or means to investigate these individual decisions and behaviours.

This individual view of the firm considered by Penrose (1959) and supported by Foss et al., (2008) is underpinned by the notation that firms are, in their most basic form, a collection of individuals

working together to achieve something (Penrose, 1959). As such, this logically implies that to more deeply understand how firms behave as a collective of individuals, one must understand the behaviour of those individuals within the firm, and particularly those who have the most influence and final say on the strategy of the firm.

That said, entering into the realm of individual subjectivity and individual cognitive decision making opens up the research into wide areas of psychology and neuroscience (Rilling and Sanfey, 2011). It is not the intention here to consider every stream of this diverse subject, but rather to investigate literature related to those theories that help to understand and explain how individual managers make decisions that influence the strategy of the firm. It is this individual behavioural perspective that is considered in more detail in the following section.

2.7 Theories of individual behaviour within the context of the firm

If one does consider firms simply as a collection of individuals working together to achieve something (Foss et al., 2008; Penrose, 1959), it can be logically deduced that to understand the behaviour of the firm, one must seek to understand the individuals who create the firm. This line of logic leads researchers into the realm of understanding individual motivations, attitudes, decision making and behaviours.

It is understandable why researchers may elect to exclude individual decision making from the scope of firm-level theory development. The complexity involved in seeking to understand individual-level decision making is no small task. Although it is a broad topic, a full investigation into firms cannot ignore the fact that it is individuals, and particularly individual managers within the firm, who make the decisions that set the direction of the firm. Consequently, this section considers literature related to management decision making and its influence on the firm.

Langley (1995) argues that management decision-making activities can be categorised into two extreme positions. On one hand, one can consider decision making as a mathematical decision-making process with a high reliance on numbers, analysis and formal reports. On the other hand, decision making can be seen as arbitrary based on the colloquial “gut feel” of managers within a firm. Similarly, the way that researchers interpret and investigate management decisions can either be carried out with the application of formal logic derived from economics and statistical

methods or alternatively from the use of descriptive accounts into how managers go about making judgements, decisions and choices (Shanteau, 2001).

A major contribution to understanding management decision making can be attributed to Simon (1957) who developed the concept of bounded rationality, which states that when individuals make decisions, their rationality is limited by the cognitive limitations of the mind and the time available to make a decision. Building on this idea, authors such as Cyert and March (1963) specifically looked to develop a behavioural theory of the firm which sought to emphasise the importance of decision making within the firm. Cyert and March (1963) argue that a firm is a coalition of individuals, each with their own aims, goals and motivations and that an understanding of these factors is key to understanding firm-level behaviours. Despite the importance and influence of the behavioural theory of the firm (Cyert and March, 1963), it did not develop into a single, unified theory of firm-level behaviour, but rather spurned the development of a range of behavioural theories of the firm, each using different underlying assumptions and generating different predictions (Argote and Greve, 2007).

One such example of these behavioural theories of the firm is that of social cognitive theory (Wood and Bandura, 1989), used as a theoretical basis to understand management decision making. However, the work of Wood and Bandura (1989) also demonstrates the difficulty of applying such a theory in the real world. The authors only apply the theory in a simulated organisational environment, arguing that the theory does not readily lend itself to experimental analysis in actual organisational settings.

In a more applied industrial context, Rafferty (1999) draws on a cognitive lens perspective to understand management decision making in the beer industry. This cognitive lens perspective focuses on the cognitive interpretation of managers when making decisions, and draws on the ideas of Reger (1990) who argues that a cognitive interpretation of managers decisions is more useful and more meaningful in strategic decision making than any objective reality identified by researchers. This view is shared by Hambrick and Mason (1984) who argue that a deeper understanding of the perceptions and attitudes of senior managers may offer substantially greater power to predict firm-level outcomes than more economically focused theories can provide. This view aligns with the ideas of Penrose (1959), who also argues that subjective interpretation by managers is more relevant to individual decision making than any external, objective facts.

Both Courtney and Foss et al., (2008) point to the importance of mental models as a means to understand and interpret how decisions are made. In this field, theories such as personal construct theory (Kelly, 1955) and the theory of reasoned action (Fishbein and Ajzen, 1977) later developed into the theory of planned behaviour (Ajzen, 1985, 1991) provide examples of mental models that aim to explain how decision making and observed behaviours can be understood through insight into the perceptions, beliefs and attitudes of individuals.

Although not generally associated with investigating the behaviour of managers or firms, the theory of planned behaviour (Ajzen, 1985, 1991) is a well-established and widely used theory (Beale, 2007) that aims to explain how actual individual behavioural actions can be predicted from an understanding of individual behavioural beliefs, normative beliefs and perceived behavioural control. The theory of planned behaviour (Ajzen, 1991) is pictorially represented in Figure 2.

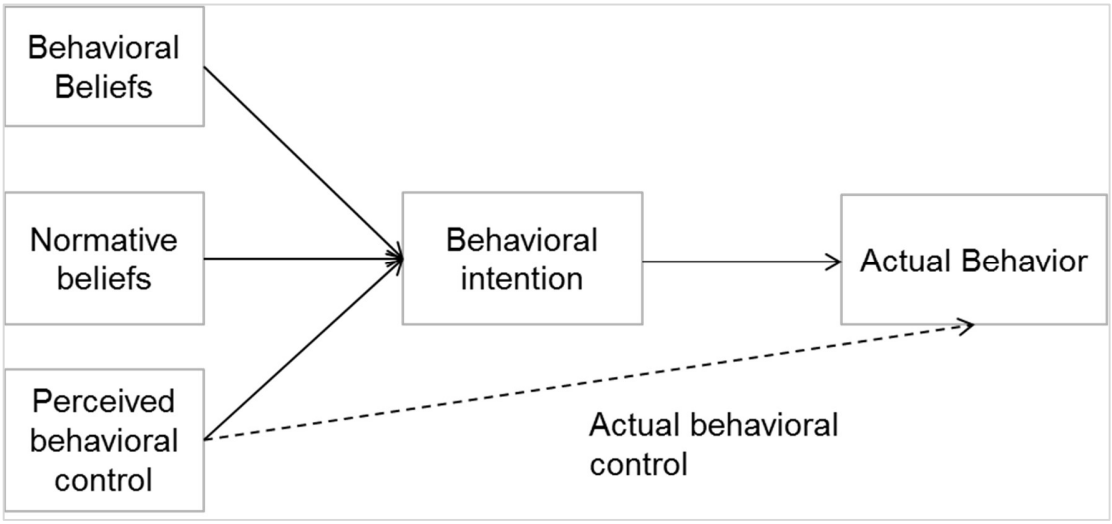


Figure 2 : Theory of planned behaviour (adapted from Ajzen, 1991)

Although the theory of planned behaviour (Ajzen, 1991) has been widely used to evaluate consumer attitudes, behaviours and decision making about purchases (Southey, 2011) it has not been extensively used to evaluate management decision making within the context of a firm. This is mainly because management decision making is considered as multi-person, multi-departmental and multi-objective in nature (Southey, 2011).

That said, the theory of planned behaviour (Ajzen, 1991) has been applied in a number of organisational contexts, and has been applied specifically to understand the behaviour and decision making of senior managers when defining firm-level strategy (Mykytyn Jr and Harrison, 1993). Southey (2011) demonstrates that the theory of planned behaviour (Ajzen, 1991) has been applied and used to understand management decision making in the areas of strategic, financial and professional decision making. However, Southey (2011) also points out that in the field of strategic decision making, the theory of planned behaviour has not been widely used and that its use in the field of strategic decision making offers an opportunity for interesting areas of future research. It is from such assertions that this research developed RQ2 and set out to investigate whether elements from the theory of planned behaviour (Ajzen, 1991) could be applied to investigate how the attitudes of managers within the firm influence management and ultimately the planned and actual behaviour of the firm.

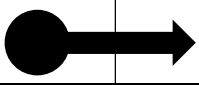
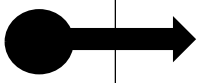
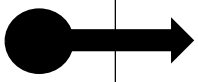
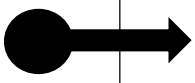
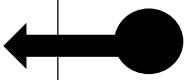
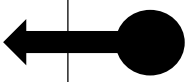
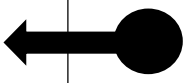
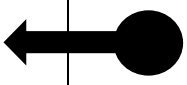
2.8 Selecting the most appropriate theory of the firm to understand firm-level behaviour

The previous sections have highlighted the diversity of theoretical perspectives that can be used to investigate firms and highlighted four different theoretical perspectives that can be used to address firm related questions, namely a macro, economic, strategic and individual subjective perspective. The previous sections have also indicated that these perspectives are not mutually exclusive and that there are areas of overlaps between the different perspectives (Teece et al., 1997).

To summarise the ideas from the previous sections, Table 2 provides an overview of the different principle elements that are frequently considered when investigating firms and also shows which of the four theoretical perspectives are generally used as a starting point to investigate those principle elements.

Moreover, Table 2 also shows that even though a specific theoretical perspective may act as a starting point for the investigation of certain elements, there is a tendency to move from that starting theoretical perspective towards another theoretical perspective when researching the elements specified. The usual direction of travel from one theoretical perspective to other theoretical perspectives is also provided in Table 2.

The table is not intended to be exhaustive of all elements that can be investigated related to firms, the list could potentially contain hundreds if not thousands of different elements. Instead, the table aims to illustrate how different elements are more closely related to some theoretical perspectives than others, and also the usual direction of travel from one theoretical perspective to another when those elements are investigated.

	Theoretical perspective			
Principle elements considered	Macro	Economic	Strategic	Individual
Interaction of the firm with other institutions such as governments, unions or universities				
The purpose of the firm, including its wider purpose and role and responsibility within society				
The firms´ responsibility towards the planet and other non-human elements				
The firm´s interaction with other firms within a market				
The reason firms exist from a cost and transaction perspective				
The external five forces on the behaviour of a firm				
The firm´s internal capabilities and how it sets out its strategy and deploy its resources				
Understanding why a firm is successful (or not)				
Understanding why a firm elects to pursue one strategy and not another				
Understanding why individuals within a firm make certain decisions and how this influences the behaviour of the firm				
Understanding how the time allocation of individuals influences the behaviour of the firm				
How the actions of certain individuals affect the behaviour of other individuals within the firm				

Key to table:

Usual theoretical perspective used as a starting point for investigations

Usual direction of travel for the investigations

Table 2 : Overview of the different theoretical perspectives that can be used to investigate firms

Like Penrose (1959), this research does not seek to argue that any one of the theoretical perspectives is better than another, but rather that different theoretical perspectives investigate firms through different lenses and therefore lead the research into different directions. Considering the four theoretical perspectives laid out in the previous section, this research uses a process of elimination to conclude that a macro, economic, and individual perspective are not appropriate theoretical perspectives from which to initiate investigations into firm-level behaviour. Instead, this research argues that a strategic level perspective is the most appropriate primary lens to initiate research into firm-level behaviour. The following sections explain in more detail the logic and rationale used to arrive at this conclusion.

The idea of using a macro-level theoretical perspective as a start point is ruled out, as this would provide too broad a perspective by questioning the wider purpose and existence of firms. Instead, this research recognises that firms do exist and that their primary purpose is to generate profits. That is not to say that this research adheres to the view that firms are only created to create profits and have no other purpose in society, but rather that the primary purpose of firms is to generate profit, and without creating a profit, the firm will not survive.

As such, this research draws on the definition of a firm provided by Penrose (1959), whereby a firm is limited to an incorporated industrial firm operated for private profit and unregulated by the state. This definition proposed by Penrose (1959) is deliberately quite specific and therefore excludes any organisations which do not have a primary aim to make a profit and also excludes those organisations that operate in highly regulated domains (such as public utility firms, which are heavily regulated by the state). Additionally, like Penrose (1959), the definition of a firm used in this research excludes pure financial or pure trading companies, as these pure financial or trading organisations are often not actively involved in setting the direction or strategy of the firm and only provide the capital to allow them to function. Using such assumptions makes the use of a macro-level perspective largely redundant to address the research questions set out in this research.

With a macro perspective ruled out, the next consideration is whether to use an economic perspective to understand firm-level behaviour. Considering the two options proposed by Teece

et al., (1997) of either first understanding the wider industry and then understanding how firms operate within the market structures of that industry (Bain, 1954), or the alternative option of first understanding the internal perspective of individual firms and then understanding how the behaviour of these individual firms influences market structures, this research opts for the latter option. There are multiple reasons for this. Firstly, although authors such as Bain (1954) and Porter (1981) argue for the need to understand the structure of the industry in which firms operate, the decision of how to define "the industry" in which any one firm operates can lead the direction of any research in many different directions (Barney, 2001). For example, does one consider Amazon as operating in the retail industry? In the E-commerce industry? In the server industry? In the advertising industry? Or in the even broader technology industry? To answer such questions, there is a requirement to create a research boundary around the wider industry and firms under investigation, which necessitates those researchers using an economic perspective to draw arbitrary boundaries around industries to be able to carry out the economic market analysis needed. The problem of selecting the industry to investigate is particularly difficult for researchers examining firm growth, as researchers would be required to specify not only the industry in which the firm under investigation operates today, but also all other possible industries into which the firm could enter in the future – an almost limitless scope.

Furthermore, by just using an economic perspective, this ignores the fact that firms, as well as being an economic unit, are at the same time, a complex and an adaptive complex social structure (Selznick, 1948). As such, a study of a firm from a purely economic perspective would overlook the complex, non-rational dimensions of firm-level behaviour (Selznick, 1948).

Such an argument against using a purely rational economic perspective leads to the alternative approach, which is to consider firms as a purely social unit. From this perspective, it is possible to argue that, to fully understand how and why firms behave as they do, requires an understanding of the individual behaviours of all individuals, or at least all key groups of individuals who influence the behaviour of a firm. When one considers that many firms consist of thousands of individuals, with each individual having their own motivations, behaviours and influences on the firm, it is almost an impossible task to initiate the investigation of firm-level behaviour at an individual level. As such, an approach which aims to understand the firm from the perspective of multiple individual perspectives, although interesting, creates practical research constraints in terms of collecting data from many individuals and high levels of research complexity in trying to understand the mental models and decision making of a large number of individuals.

The conclusion from the above considerations is that a macro perspective provides too broad a theoretical perspective than needed for a study of firm-level behaviour. An economic perspective ignores too many non-rational, arbitrary, but important social considerations, individual decisions and behaviours that influence the behaviour of the firm. Conversely, a purely individual subjective perspective also provides too broad a theoretical basis to understand firm-level behaviour, as it requires a deep understanding of multiple perspectives of individuals or groups that can influence firm-level behaviour.

From this process of elimination, it is concluded that a strategic perspective of the firm is the most relevant theoretical perspective to initiate an investigation into firm-level behaviour. The strategic perspective allows researchers to consider the firm as one unit of analysis and places the firm, rather than the industry in which the firm operates, as the start point for any research. Such an approach aligns well with the research questions set out in this research, which seek to understand and explain the behaviour of a firm. However, although it is argued that the strategic perspective is the most appropriate lens to initiate the investigation into firm-level behaviour, this should not be interpreted as an argument that the other perspective should be ignored. Instead, like Teece et al., (1997) this research supports the view that researchers should seek to create bridges that cross into the other theoretical perspectives of macro, economic and individual perspectives. In particular, this research seeks to create a bridge between the strategic and individual perspective.

However, the selection of the strategic perspective as the start point to investigate firm-level behaviour now allows this research to explore in more depth two existing theories that fall under the category of strategic perspectives. Namely, this research explores the Resource-based View (Barney, 1991; Wernerfelt, 1984) as it has been widely as a theoretical base to investigate firm-level behaviour (Walker et al., 2015). This research also elects to explore the Theory of the Growth of the Firm (Penrose, 1959), which is proposed as a distinct, and alternative theoretical basis to the Resource-based View as a means to understand firm-level behaviour.

2.9 The theory of the growth of the firm as an alternative to the Resource-based View

As already discussed in previous sections, many authors consider the Theory of the Growth of the Firm (TGF) as a precursor to the development of the Resource-based View (RBV), with some even going as far as to argue that they are one and the same thing (Mahoney and Pandian, 1992). It is argued in this research that there are fundamental differences between the two theories. This argument that RBV is fundamentally different to TGF is a view also supported by Rugman and Verbeke (2002), who argue that Penrose´s ideas are very different from those prevailing in most modern resource-based thinking and that Penrose´s (1959) original work needs to be reread much more carefully by management scholars than has been done in the past.

In this research, it is not the intention to simply provide a summary of Penrose´s (1959) theory of the growth of the firm as an overview of the key ideas is already provided by Kor et al., (2016). Instead, this research aims to provide a comparison of RBV and TGF to highlight the distinct ideas developed by Penrose (1959) that are not addressed in contemporary RBV (Barney, 1991; Wernerfelt 1984)

The basic concept of RBV (Barney, 1991; Wernerfelt 1984) is that firms must obtain access to and then exploit VRIN resources to achieve sustainable competitive advantage (SCA), which will then, in turn, generate higher than average rents. This contrasts with TGF (Penrose, 1959), which begins with the identification of productive opportunities for the firm, which the firm must then have available management resources to be able to exploit and absorb into the firm, which in turn then lead to growth. Figure 3 provides a very high-level comparison of the key steps implied under RBV compared to those in TGF.

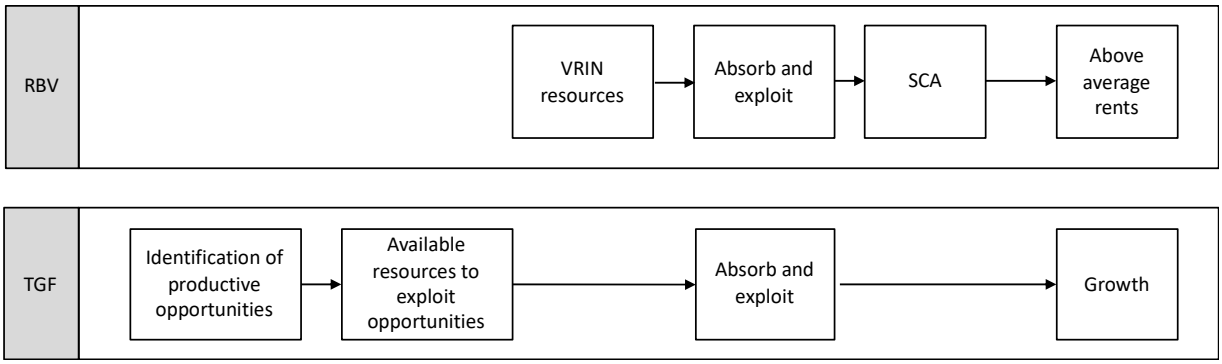


Figure 3 : High level comparison of steps in RBV and TGF (author´s interpretation)

Figure 3 demonstrates that RBV and TGF start in different places. Whereas RBV starts with an investigation into VRIN resources, TGF starts with an investigation and identification of the productive opportunities available to the firm. Figure 3 also demonstrates that RBV and TGF end at a different place, with the former focused on achieving above average rents, and the latter focused on achieving growth. As such, although there are areas of similarity between RBV and TGF in terms of absorbing and exploiting productive opportunities and making use of resources to do so, the start and endpoint of the two theories are fundamentally different.

From this insight, It is argued that as many researchers (Conner, 1991; Helfat and Peteraf, 2003; Kor and Mahoney, 2000; Kraaijenbrink et al., 2010) begin their theoretical critiques with the Resource-based View developed by Barney (1991), there is a missed opportunity to return to Penrose´s original theory of the growth of the firm (Penrose, 1959) and seek answers to the gaps in RBV that are addressed in Penrose´s (1959) original theory. As such, it is argued that rather than adding to the already substantial literature debating the advantages and gaps of RBV (Barney, 1991), a different theoretical perspective, that of TGF (Penrose, 1959), should be considered as a basis to better understand firm-level behaviour.

2.9.1 Rationale for selecting Theory of the Growth of the firm over the Resource-based View.

Despite or perhaps because RBV is so widely used in business research (Walker et al., 2015), it has been the subject of a number of critiques and debates, such as those provided by Priem and Butler (2001) and subsequently rebuffed by Barney (2001). The debates about RBV continue today and Kraaijenbrink et al., (2010) provide an overview of eight critiques levelled at RBV and the defences against these critiques. The authors group the critiques of RBV under eight headings.

a) RBV has no managerial implications
b) RBV Implies Infinite Regress
c) RBV's applicability is too limited
d) Sustainable Competitive Advantage (SCA) is not achievable
e) RBV is not a Theory of the Firm

f) VRIN/O Is neither necessary nor sufficient for SCA
g) The value of a resource is too indeterminate to provide for useful theory
h) The definition of resource is unworkable

Of the eight critiques, Kraaijenbrink et al., (2010) argue that critiques one to five are unfounded, but critiques six, seven and eight remain to be resolved. The aim in the following section is not to resolve these critiques of RBV, but rather to see if the above critiques also apply to Penrose's (1959) theory of the growth of the firm or whether Penrose´s (1959) theory of the growth of the firm can resolve some of the critiques directed at RBV.

a) RBV lacks managerial implications

The use of RBV is widely accepted for use in business research and its wide application has even been considered as timeless (Walker et al., 2015). Despite this, it can also be argued that RBV has limited management implications as although the theory helps researchers understand why one firm may be more successful than another, it does not provide managers with any practical indication on how to create a successful firm (Priem and Butler, 2001). In fact, when defending RBV against this critique, Kraaijenbrink et al., (2010) do not so much argue that RBV does have management implications, but rather that it was never intended to do so. In contrast to this, it can be argued that TGF does provide more practical insight to managers. For example, one of the major contributions, if not the main contribution from Penrose´s (1959) theory of the growth of the firm is the proposition that

"The capacities of the existing managerial personnel of the firm set a limit to the expansion of that firm in any given period of time" (Penrose, 1959, chapter 4)

With this insight, Penrose places the emphasis on the availability of management capacity on developing and growing the firm. From this, Penrose (1959) makes a distinction between two types of management capacity, the first Penrose (1959) refers to as "management services", a service used by every firm to administer and manage the firm, and the second Penrose (1959) refers to "entrepreneurial services", a service specifically related to identifying and exploiting new productive opportunities. Penrose (1959) argues that the firm needs management capacity to do both and that this management capacity ultimately creates "a fundamental and inescapable limit to the amount of expansion a firm can make at any one time" (Penrose, 1959, Chapter 4).

As such, Penrose´s (1959) theory has clear management implications. In fact, it can be argued that Penrose´s theory of the growth of the firm places management at the heart of the theory of the firm, and invites managers to consider how constraints on their personnel time may be constraining the growth of the firm in which they work. With the theory of the growth of the firm (Penrose, 1959), the focus is placed on maximising the use of individual management time, an important finite resource (Schwartz and McCarthy, 2007) for any firm.

b) RBV implies Infinite Regress

One could argue that the critique of infinite regress applies to both RBV and TGF. But, whether this is a problem depends on the epistemological perspective of the researcher (Lado et al., 2006). For researchers investigating management as a positive quest for quantified certainty, both RBV and TGF suffer from the limitation of infinite regress. However, for those researchers who understand strategic management as an open-ended series of interactions (Kraaijenbrink et al., 2010), both RBV and TGF are arguably useful to understand those interactions.

However, it can be argued that TGF does not imply infinite regress in every sense. Researchers using RBV can get trapped in an infinite regress of seeking to carry out a never-ending search for the source of a firm´s initial capability development (Kraaijenbrink et al., (2010). In contrast, TGF does have a clear point of initiation, the point at which management time is dedicated to a firm. As such, with TGF it is possible to return to the very origins of a firm, when management time is applied to seek a new productive opportunity to create a firm. As such, there is a clear start point when applying TGF, which cannot be said for RBV.

c) RBV's applicability is too limited

Kraaijenbrink et al. (2010) argue that RBV suffers from three limitations under this heading, each one is considered separately here. First, by making the argument that all firms are heterogeneous and unique, by definition, this makes RBV ungeneralizable across other firms. This critique could also be applied directly to TGF. But this limitation to TGF is only applicable *vis-à-vis* the research question being asked. For those researchers looking to understand the behaviour of all firms across an economy (a top-down approach), both RBV and TGF have serious limitations, but for

those researchers wanting to understand the individual behaviour of firms within a given industry or economy, as is the case in this research, then both RBV and TGF prove useful (Connell, 2007).

The next limitation under this heading is that RBV only applies to large firms and is not relevant to small firms Kraaijenbrink et al., (2010). This critique is not applicable for TGF, as Penrose (1959) stresses that her theory of the growth of firm aims to provide a general theory of growth for all firms and that it is not limited to either large or small firms alone. In fact, Penrose (1959) provides specific details of how small firms are able to compete with large firms, despite the latter having access to more resources. Penrose (1959) proposes that the reason that small firms are able to compete with large firms is due to the existence of industry "interstices" (Penrorse,1959, chapter 10). These "interstices" are the profitable opportunities that exist that smaller firms are able to identify and exploit more quickly than large firms, or the profitable opportunities that larger firms elect not to pursue, as other larger profitable opportunities lay elsewhere.

The third limitation specifies that RBV is only relevant to firms pursuing SCA and that for those who are content with their competitive position, RBV is not relevant (Kraaijenbrink et al., 2010). This critique could be applied to TGF but in a different context: in the same way that it can be argued that RBV is only applicable to those firms who seek to achieve an SCA, it can also be argued that TGF is only applicable to those firms who want to grow. This is in fact the assumption specified by Penrose (1959) in the theory of the growth of the firm. With this argument, TGF would not be directly applicable for firms that are not actively looking to grow but are perhaps looking to exit or sell the firm. However, it can be argued that even for a firm that is content with the firm size and has no ambitions to grow, TGF is still relevant. Consider for example a firm that does not want to grow but wants to maintain its current size. For this firm to maintain its current size in the long term, it would arguably need to adapt and respond to market changes, growing in some markets to offset a decline in others. Thus, it is argued that some form of firm growth is needed even to maintain the current size of a firm, and thus TGF can arguably be applied to all firms that wish to survive, whether they are explicitly trying to grow or not.

d) Sustainable Competitive Advantage (SCA) is not achievable

The next critique reveals an important distinction between RBV and TGF. Whereas for the former, the objective is to achieve SCA, in TGF, the objective is to achieve growth. One could argue that SCA is a requirement to achieve growth, but this may not always be the case, as a firm can

achieve fast short growth through mergers and acquisitions, but this may not necessarily lead to any form of SCA.

Thus, this critique does not apply to TGF and in fact, it is argued that this is one of the strengths of TGF compared to RBV. Whereas in RBV it is difficult for researchers to measure and understand the point at which a firm has achieved SCA, TGF, in contrast, aims to understand firm growth, which is a measurable, definable factor that can be more easily researched and investigated. That is not to say that measuring growth is not without its pitfalls (as discussed in later sections), but it can be argued that growth is a more easily measurable output than attempting to measure the vague notion of SCA.

e) RBV is not a Theory of the Firm

As already discussed and argued in the previous chapters of this research, there is no one theory of the firm and firms can be studied from multiple perspectives depending on the question being asked. Despite this, authors have traded views on whether RBV constitutes a theory of the firm or not (Conner, 1991). If one argues that a theory of the firm should explain why firms exist (Kraaijenbrink et al., 2010) then neither RBV nor TGF seem appropriate. Instead, both RBV and TGF are concerned with how and why certain firms are successful (or not), and do not seek to explain why firms exist. Penrose (1959) specifically states her definition of the firm and what its scope and limits are and does not aim to enter the prickly discussions of seeking to explain why firms exist. Thus, this critique is avoided with Penrose´s TGF (1959).

Until now, critiques 1-5 have been considered, all of which Kraaijenbrink et al., (2010) argue RBV stands up against and which it has been argued here, that TGF also stands up against, although in some cases for different reasons than RBV. However, the remaining critiques, Kraaijenbrink et al., (2010) argue that RBV does not hold up against, and thus, more consideration is placed on these to assess whether the critiques are justified for TGF.

f) VRIN/O Is neither necessary nor sufficient for SCA

As discussed in earlier paragraphs (see in particular Figure 3), RBV begins with identifying VRIN/O resources and seeks to explain how firms use these resources to achieve SCA. In contrast, TGF does not rely on explaining VRIN/O resources as an input, nor the achievement of

SCA as an output. As such, this critique of VRIN/O and SCA, against which RBV does not stand up (Kraaijenbrink et al., 2010) does not apply to TGF, as TGF does not rely on either VRIN/O or SCA as key determinants in the theory.

g) The value of a resource is too indeterminate to provide for useful theory

The focus on the interaction between resources, VRIN and SCA poses particular problems for RBV, as all three terms are difficult to define and quantify, which invites the criticism that RBV relies on statements that are tautological; true by definition, but not able to be tested Kraaijenbrink et al., (2010). At the heart of this critique are the assertions made by Barney (1991) that to achieve SCA, the firm must have VRIN resources, while simultaneously arguing that resources become valuable when they allow a firm to achieve an SCA. Such arguments remain unresolved in RBV, but it is argued here that this stream of research, with its focus on defining and understanding interactions between undeterminable notions such as VRIN resources and SCA is becoming a purely theoretical and abstract debate and of limited relevance for practitioners. It is therefore argued that research time would be better spent on developing and using alternatives to RBV to understand firm-level behaviour, rather than needlessly trying to determine the inherently undeterminable terms that exist in RBV.

h) The definition of resource is unworkable

A further critique that can be levelled at both RBV and TGF is around the clarification of the definition of the term resources. For RBV, the term encompasses all types of resources, both tangible and intangible, and thus such a broad definition becomes difficult to specify, particularly when the term includes such difficult to investigate resources such as knowledge (Grant, 1996). Penrose is more specific in her definition and focuses on what Penrose (1959) argues is the key resource to be considered when investigating firms – that of availability of management services to the firm. This availability of management services is a much more determinable resource as availability of management services can be easily defined in terms of the amount of management time available to the firm.

It is also worthy of note that Penrose herself was critical of the focus put on the “resources” available for a firm (Blundel, 2015). Instead, Penrose (1959) argued that the resource-based literature has been too concerned with the analytical properties of the resources themselves and

that it tends to neglect the fundamental insight that resources are just a means to an end, and that the use of resources in different ways to provide diverse productive services is the source for firm-level heterogeneity (Penrose, 1959). As such, TGF places its emphasis on understanding how resources are used to develop and exploit productive opportunities in order to grow the firm, whereas RBV places its emphasis on the availability of the resources.

To recap on the various critiques of RBV highlighted by Kraaijenbrink et al., (2010), it is found that TGF stands up against all of the critiques of RBV. It is from this review, that this research proposes TGF as a superior theoretical basis to understand firm-level behaviour that RBV. However, it is also recognised that just because TGF stands up to the critiques of RBV, this cannot be assumed that it does not stand up to other critiques. To uncover these critiques of TGF, it is first necessary to provide additional details on Penrose´s TGF (Penrose, 1959), in particular on the key insight proposed by Penrose that firm-level growth is constrained by the availability of management services to the firm. This insight is such an important element of TGF that the next section is dedicated to reviewing the insight in more detail.

2.10 Management services as the key constraint to firm-level growth

Penrose (1959) lays out many logical and compelling arguments within the theory of the growth of the firm. Kor et al., (2016) list 14 different ideas generated in Penrose's seminal 1959 book. However, this section focusses on what this research considers as the main contribution from Penrose´s (1959) theory of the growth of the firm, namely the proposition that:

"The capacities of the existing managerial personnel of the firm set a limit to the expansion of that firm in any given period of time" (Penrose, 1959, chapter 4).

Thus, for Penrose (1959), the primary constraint to growth for any firm is the availability of management services, and it is access to available management services that limit the rate at which a firm can grow in any given period of time (Tan and Mahoney, 2005).

As well as providing a new insight into what limits firm growth, Penrose (1959) also proposed a powerful argument on what does not constrain growth. Prior to Penrose (1959), the classical

economic argument from authors such as Coase (1937) was that firms are constrained by market demand, access to capital, land or equipment. In fact, this view that firms are constrained by access to capital, land or specialist knowledge or equipment prevails today (see Kumar et al., 1999).

Penrose (1959) rejects this view and argues that all of these constraints can be overcome by firm management. Penrose (1959) specifically argues that even market demand is not a constraint on firm growth, as the firm can effectively move into other markets and can also influence demand with the development of new products and services, and that a skilled manager can help to create demand for new products and services. Equally, Penrose (1959) argues that a skilled manager will find ways to seek out and obtain access to capital, land, knowledge and equipment. This returns to Penrose´s (1959) core argument, that management services, and not access to any other resources are the key constraint to firm growth.

Penrose (1959) also contradicts the arguments of Evans (1987). Evans (1987) proposes that the age or current size of the firm are the principal drivers that influence the rate of the growth of the firm. Instead, Penrose (1959) argues that neither the age nor the current size of the firm constrains growth and that there is no natural equilibrium or optimal firm size (Rugman and Verbeke, 2002). In fact, Penrose (1959) specifies that it is the responsibility of existing management to adjust the administrative set up of the firm to allow the firm to continue to grow. This again places the availability of existing management services at the heart of understanding firm-level growth.

Within the term “management services”, Penrose (1959) identifies three important subgroups, namely:

a) central management services,
b) administrative and technical management services,
c) entrepreneurial management services.

Penrose (1959) highlights the importance of the central management services group. The term central management, as used by Penrose (1959), should not be confused with the frequently used term senior management (see for example Crawford, 2005). The latter term can refer to any number of managers within a firm, whereas Penrose (1959) is very specific with what is meant by the central managers of a firm. For Penrose (1959), the existence of a central management group

that sets out the general policies under which the firm´s administrative hierarchy operates is what defines and bounds a firm. As such, Penrose (1959) defines central management as the “court of last resort” and the group of managers within the firm who have ultimate responsibility for setting the direction for the firm. Such a precise definition of this central management group is useful, as one could argue that unless a plan or direction (or strategy) is authorised by this central management of the firm, it is not a firm-level strategy.

In addition to highlighting “central management” as a key type of management service available to the firm, Penrose (1959) also makes the distinction between “administrative and technical management services” and “entrepreneurial management services”. Penrose (1959) argues that the former is a service used by every firm to administer and manage the firm, and the latter is a service specifically related to identifying and exploiting new productive opportunities.

One particularly useful insight proposed by Penrose (1959) is that the availability of existing administrative management services, and not entrepreneurial management services act as the primary constraint to firm-level growth. Penrose (1959) argues that it is the capacity of existing management services within the firm which ultimately creates “a fundamental and inescapable limit to the amount of expansion a firm can make at any one time” (Penrose, 1959, Chapter 4). With this, Penrose (1959) argues that even if the firm has access to many entrepreneurial ideas and opportunities, the firm´s growth will be limited by its ability to incorporate these ideas into the firm´s strategy and plans, the task of administrative management services.

This said, Penrose (1959) also recognises that another key constraint to firm-level growth does exist, that of the extent to which a firm sees opportunities for expansion, which are the opportunities that are generated from the availability of entrepreneurial services. As Penrose herself explains:

“It is clear that the opportunity will be restricted to the extent to which a firm does not see opportunities for expansion, is unwilling to act upon them or is unable to respond to them" (Penrose, 1959 chapter 4)

As such, Penrose proposes that the availability of existing administrative management services is the primary constrain to growth, but also that a lack of entrepreneurial services can also constrain firm-level growth (as a secondary constraint). As such, Penrose (1959), not only

explains that availability of management is the constraint to firm-level growth but also specifies how certain types of management services can constrain growth in different ways.

One way to test the applicability of these insights provided by Penrose (1959) is to review how her ideas have been applied and tested since TGF was first published. Before doing this however, it is considered necessary to first consider the critiques directed at Penrose´s original theory of the growth of the firm (Penrose, 1959). These critiques are provided in the next section.

2.11 Critiques of Penrose's theory of the growth of the firm

There is a surprisingly limited number of critiques on Penrose's (1959) original theory of the growth of the firm (Pitelis, foreword to Penrose, 2009). Pitelis (foreword to Penrose, 2009) attributes this lack of critiques to Penrose herself, and her reluctance to actively challenge the other mainly economic-based theories of the day. According to Pitelis (2009), Penrose (1959) did not consider her theory of the growth of the firm to be mutually exclusive to the theories provided by economists such as Coase (1937), but rather that her theory merely looked at firms through a different lens than the traditional economic perspective. Although limited, a number of critiques about TGF do exist.

This section begins with those critiques that Penrose highlighted herself (Nair et al., 2008) towards the theory of the growth of the firm. Firstly, Penrose (1959) recognises that her theory cannot be used to examine a particular firm and predict whether it will grow, rather Penrose states:

"I am not asking what determines whether a particular firm can grow, but rather the very different question; assuming that some firms can grow, what principles will then govern their growth, and how fast and how long they can grow" (Penrose, 1959: pg 7)

As well as the limitations of applying the theory to one specific firm to predict the firm's growth, Penrose (1959) also acknowledges the difficulty of analysing and testing the principles against multiple external factors in the real world,

“partly because of the difficulties in expressing some of the concepts in quantitative terms and partly because of the impossibility of ever knowing for any given firm what is, or would have been, its maximum rate of growth” (Penrose, 1959: pg 4)

In other words, how can one ever test if the theory is correct when it is impossible to compare and quantify it to an alternative scenario that did not happen? Although simulation software may allow some form of hypothetical comparisons of different scenarios, the work of Geroski (2002), highlights the complexity of using mathematical models to understand firm-level growth in the real world. On this point, Penrose acknowledges that:

“The testing of the theory set forth…is difficult indeed; all sorts of factors other than those controlling its “maximum” rate of growth will affect the actual rate of growth of an individual firm” (Penrose, 1959: pg 4)

In addition to these critiques proposed by Penrose herself, other critiques do need to be considered. The principal gap in Penrose’s (1959) theory, also suggested by Pitelis (foreword to Penrose, 2009), is the difficulty of summarising all of Penrose’s ideas into a unified framework that can be applied and tested. The understanding of the complete theory proposed by Penrose (1959) is key, in her own words:

“The entire study is a single argument no step of which can be omitted without the risk of misunderstanding later conclusions” (Preface to Penrose, 1959, p. i)

That Penrose (1959) generated many new ideas is not questioned. In fact, it is perhaps due to the breadth of Penrose’s ideas that it can be difficult to pull together Penrose’s ideas into any kind of framework, a *sine qua non* for empirical theory testing. Thus, to use and begin to test the original theory proposed by Penrose (1959), scholars are first required to create their own interpretation of Penrose’s (1959) theory into a testable framework, opening up the potential criticism of creating a framework that does not fully capture Penrose’s (1959) original ideas and theory.

A further critique of the theory of the growth of the firm (Penrose, 1959) is that it does not lay out a clear position on the timeframes to be considered when applying the theory. As such, the focus is more on understanding the rate of growth at any one time rather than understanding the

timeframes of growth. However, this argument is a weakness in the theory, as any measure of growth, by definition, must have a start point and endpoint to permit the measure of growth between the two periods. It is perhaps easiest to explain Penrose´s (1959) position on time horizons by comparing it those of RBV (Barney, 1991). Like Penrose (1959), Barney (1991) also avoids specifying the time frame under which RBV applies. Barney (1991) defines the time period under consideration using the term “sustainable” to refer to the time period that the advantage must be held for. Barney (1991) goes on to specify that firm performance should not be measured in calendar timeframes, but more in terms of whether other competitors can match the position of the firm and bring the advantage back to a level of equilibrium.

This perspective provides an interesting distinction between TGF and RBV and helps to shed light on Penrose’s perspective on this topic. Penrose rejects the equilibrium based assumption that is often applied in RBV (Lockett, 2005). This equilibrium assumption posits that firms can gain an advantage, but that advantage will be eroded over time and they will cease to grow. Instead, Penrose (1959) argues that rather than trying to sustain an advantage, the firm should be focused on the creation of new advantages in order to survive in the long term. Thus, for Penrose (1959), growth can occur at any time and that those firms that cease to grow are guilty of not adapting the management structure to the demands of running a larger firm. Hence, Penrose (1959) argues that the focus should be on measuring the rate of growth in perpetuity, not during any particular time. Penrose (1959) proposes that the only constraint to growth is a lack of adaption of the firm to create further growth in new areas (identifying and exploiting new productive opportunities). For this reason, Penrose (1959) also rejects the notion of using life cycle analogies to map out the life of firms over time, as these make no provision for abrupt discontinuities and identity changes of the firm (Penrose, 1959).

Although the debate about the timeframe that should be considered when measuring firm growth leads to interesting ideas and areas of difference between researchers, the lack of agreement on the timeframe under which the theory applies leaves an important practical gap when managers look to apply the theory in practice. Namely, under which time frame does TGF apply and does it need to be applied differently for those firms strategizing according to different time frames?

A further critique of Penrose (1959) theory of the growth of the firm is the lack of a clear measure of growth. Penrose (1959) argues that firm size and growth can be measured in different ways, including using turnover, number of employees, profit, market capitalisation, fixed assets or share

price. As Penrose (1959) acknowledges, there is no one way of measuring growth or even the size of the firm that is not open to serious conceptual objections.

Penrose (1959) argues that revenue and profits are the correct measures of growth and that they are one and the same thing. However, it is difficult to argue that revenue and profit are one in the same thing when the two numbers can often follow very different trajectories (see for example Tesla´s financial sales and profit). In fact, Penrose (1959) ambiguity over the correct measure of growth makes it difficult to operationalise the theory and leaves open the question of whether growth should be measured in terms of sales or profits. Interestingly, when Penrose herself applied the TGF (Penrose, 1960) in a single case study research, neither sales not profit were used as the measure of growth, instead, Penrose used fixed assets. This also suggests that Penrose herself struggled to find a satisfactory measure of growth when using her own theory.

Despite a large number of studies on firm growth, many drawing on the ideas of Penrose (1959), relatively few studies were identified that aimed to empirically test the theory developed by Penrose (1959). This sparsity of examples in which TGF is applied is perhaps because although Penrose (1959) provides an explanation of the theory of the growth of the firm, Penrose does not create any specific framework or model that allows for theory to be easily applied in practice (Kor et al., 2016).

Returning to Whetten's (1989) criterion for theory laid out at the beginning of this chapter, one could argue that Penrose's theory of the growth of the firm meets only two of the four criteria for a theory. TGF does identify the factors that explain the phenomenon (in this case growth) and TGF does explain when, to whom, and where it is applicable. But TGF does not clearly and fully lay out how the factors are related, nor the underlying dynamics which explain the relationships of the factors. Although TGF as outlined by Penrose in 1959 may not have met all of the criteria for a theory as specified by Whetten (1989) this has not stopped researchers looking to apply and test the theory. In the next section, these attempts to apply TGF (Penrose, 1959) are considered.

2.12 Applications of the theory of the growth of the firm

It is recognised that Penrose´s TGF (1959) forms the basis of many other theoretical ideas and insights. However, this section specifically considers examples where Penrose´s original theory of the growth of the firm (Penrose, 1959) has been specifically applied and tested.

Penrose herself applied the theory of the growth of the firm at the Hercules Powder Company. (Penrose, 1960). In this, Penrose (1960) identifies the crucial role of the changing nature of the firm´s management perception of its own resources in the determination of the firm's course of expansion. This is an important element worth highlighting from the Hercules Powder company case study, Penrose (1960) concludes that what changed over time was the attitude and knowledge of the manager´s about the firms' resources, and not the resources themselves. As such, Penrose (1960) indicates that management attitude and knowledge is the key driver of selecting the paths to growth, rather than any observable change to the resources available to them.

Thus, the case study (Penrose, 1960) illustrates the relative importance of management attitudes about their firms' resources, knowledge and capabilities, compared to any objective measures of actual resources available. In the study, Penrose (1960) focuses on applying the theory of the growth of the firm to address two key questions: What determines the direction of expansion for the firm and what determines the rate of growth? Penrose concludes that both questions are mediated by the firm's attitude towards developing new ideas, or to use Penrose´s own words, the firm´s "conception of itself" (Penrose, 1960, pg 23). In particular, Penrose (1960) highlights that the firm's rate of growth was constrained by the knowledge and experience of its existing personnel and in particular, the confidence that the management team had of generating profits from new areas with which they were not familiar. Although this insight that management attitudes and the firm´s conception of itself were found to be key phenomena when Penrose (1960) sought to apply the theory of the growth of the firm (Penrose, 1959), it appears that contemporary researchers have not looked for specific methods to develop Penrose (1959) theory of the growth of the firm to understand these important elements of management attitudes and the firms´ conception of itself (Penrose, 1960).

Looking beyond Penrose's (1960) case study and for practical applications of the TGF more broadly, Ardishvili et al., (1998) argue that empirical studies into the growth of the firm can be broadly split into two types (a) studies which seek to understand the factors of growth and (b) studies which seek to understand the process of growth. The former types aim to gain an

understanding of why firms grow, usually with antecedents of growth identified and growth treated as a dependent variable. The latter are concerned with the changes that take place in a firm as a consequence of growth, or in other words, growth is considered as the starting point and the cause.

The work of Davidsson and Wiklund (2006) highlights the large number of studies that have been carried out focused on growth in small firms, including 105 published and unpublished studies collated by (Ardishvili et al., 1998) and 55 studies collated by (Delmar et al., 2003). In fact, there appears to be an abundance of research looking specifically at growth within small firms. Authors carrying out such research include Davidsson and Wiklund (2006), Dobbs and Hamilton (2007) and Gibb and Davies (1990). Interestingly, Gibb and Davies (1990), like Phelps et al., (2007) investigate the growth of small firms with reference to life cycle analogies, a notion that Penrose (1959) specifically rejected.

Applications of the theory of the growth of the firm are not only restricted to small firms. Burgelman (1991) applies ideas from Penrose (1959) to study growth at Intel, a large semi-conductor firm and Klette and Kortumm (2004) use ideas developed by Penrose to investigate R&D and innovation in large firms.

In terms of testing and applying the theory of the growth of the firm (Penrose, 1959) with empirical, quantified data, few examples are found. Geroski (2002) is one notable exception. On reviewing four different theories of the firm, including the theory of the growth of the firm (Penrose, 1959), Geroski (2002) concludes that the theory cannot be proven with economic analysis or mathematical facts. Instead of seeking to mathematically test theories such as the theory of the growth of the firm (Penrose, 1959), the tendency is for researchers to seek to develop mathematical models to more broadly look for factors influencing firm-level growth, investigating, for example, the influence of age, size and industry on firm-level growth (Coad and Hölzl, 2012; Evans, 1987; Stanley et al., 1996). The only clear discernible model developed from such mathematical research into firm-level growth is the development of Gibrat´s law (Coad and Hölzl, 2012). This law states that the proportional rate of growth is independent of the firm´s absolute size. Even though this mathematical law is considered as flawed, it is often relied upon by researchers, for lack of a better alternative (Stanley et al., 1996).

Although mathematicians and economists have struggled to find mathematical proofs to directly test Penrose theory of the growth of the firm (Penrose, 1959), the theory has spurned a host of new ideas, inductive insights and theoretical developments (Kor et al, 2016). These ideas, developed or linked to Penrose´s theory of the growth of the firm, continue to influence contemporary research and thinking. The following section explores some of these ideas that are built on or strongly connected to the work of Penrose and considered relevant for this research.

2.13 Contemporary ideas and insights developed related to the theory of the growth of the firm

Penrose´s theory of the growth of the firm is cited over 30,000 times (Google Scholar, accessed November 2018). Thus, an examination of all the research ideas built on the foundations of Penrose´s initial work is beyond the scope of this research. However, as it is argued in this research that the key idea developed by Penrose (1959) is the notion that management services is the key determinant of firm-level growth, this section focuses specifically on ideas that are linked to this key insight. First, this section explores how Penrose´s insight related to a firm´s requirement to have access to distinct types of management services has spurned a host of research into distinct management types. Next, this section explores how access to different types of management services within the firm has led to the concept of ambidextrous firms (Duncan, 1976). Lastly, this section looks at how Penrose´s ideas on entrepreneurial management services have been developed to explore the specific link between the availability of entrepreneurial services and firm-level growth.

The differentiation of distinct types of management services proposed by Penrose (1959) is closely related to the ideas developed by Zaleznik (1977), who sought to identify the differences between managers and leaders. In this, Zaleznik (1977) argues that managers focus on rationality and control and adopt impersonal attitudes and reactive attitudes towards achieving the firm´s goals, whereas leaders, in contrast, are active instead of reactive, seek out new opportunities, are willing to take risks, and look to shape, rather than be shaped by the firm´s goals. These differences between managers and leaders proposed by Zaleznik (1977) echoes the differences outlined by Penrose (1959) between administrative and technical management services and entrepreneurial management services. Interestingly however, Penrose (1959) does not use the term leader or leadership in TGF, and arguably her work predates the notion of leadership being

a topic worthy of serious intellectual enquiry (Podolny et al., 2004). However, by distinguishing between administrative and technical management services on one hand, and entrepreneurial management services on the other, Penrose (1959) highlights the importance of these two different types of management services to the firm, and arguably her reference to the idea of entrepreneurial management services predates later research about the importance of leaders who can change the direction of firms.

This idea of distinguishing between different types of management services as suggested by Penrose (1959) has developed into a wide field of research, with investigations into, for example, the distinction between transactional and transformational managers (Burns, 1978; Kuhnert and Lewis, 1987), managers compared to leaders (Zaleznik, 1977), and entrepreneurial managers compared to bureaucratic managers (Chen et al., 1998). It is not the intention in this research to delve deeply into these distinctions, but rather to highlight that Penrose´s proposal that different types of management services need to be considered when investigating firm-level behaviour has played a large influence on contemporary research.

The idea that different types of management services are available to the firm is at the heart of the concept of ambidextrous firms (Birkinshaw and Gibson, 2004; Dover and Dierk, 2010; Duncan, 1976; Tushman and O'Reilly III, 1996). This idea posits that firms must find the right balance between managing the firm´s existing activities while at the same time looking for opportunities for the future. This idea of finding the right balance between exploiting existing capabilities and exploring and developing new productive opportunities echoes the previously discussed Penrose effect (Tan and Mahoney, 2005). As outlined by Penrose (1959), the key challenge for management within a firm is managing the constraint of management services and deciding whether to focus management services on looking for new productive opportunities or exploiting existing ones. Although proponents of the ambidextrous firm concept argue that firms need to do both, Penrose´s theory of the growth of the firm (1959) provides a means to investigate this balance in more detail by considering how much management time is invested in each. Research by Birkinshaw and Gibson (2004) highlights the difficulty of finding this right balance, and although the authors point to a number of example firms to demonstrate the dangers of getting the balance wrong and the advantages of getting the balance right, they rely on subjective interpretation of how ambidextrous a firm is and how well it is performing, rather than any objective measure of either. Moreover, if one considers Penrose (1959) argument that availability of management services is the key constraint to firm-level growth, and that availability of

management services can be measured in terms of available management time, then it raises the question of how much management time should be dedicated to managing the firm´s existing activities and how much should be dedicated to looking for future opportunities. No evidence in the literature is found that aims to investigate such a question, and how a rebalancing of management time allocation between time dedicated to the existing firm´s activities or looking for future opportunities may impact the growth of the firm. This is a gap that is explored in more detail in this research.

As demonstrated in the sections above, one of the strengths of Penrose's (1959) theory is that it forms the foundations for many more recent theory development topics in the area of business management. However, the aim here is not to explore the theories that have developed from Penrose's work, but rather go back to the author's original work (Penrose, 1959) and test the suitability of the theory to answer the research questions set out in this research. Before testing the suitability of the theory of the growth of the firm (Penrose, 1959) to address the research questions, the next section provides an overview of contemporary ideas which have specifically looked to improve and develop Penrose´s original (1959) theory.

2.14 Contemporary developments of the theory of the growth of the firm

As discussed in early sections of this chapter, many authors consider that RBV is a development of and successor to TGF. However, other researchers have returned to Penrose's (1959) original ideas with the aim of refocusing on and improving Penrose's original theory developed in 1959. It is the work of these contemporary researchers who have sought to develop Penrose's (1959) initial theory that this section now considers.

It is identified that contemporary researchers have focused on improving Penrose´s TGF (1959) in two main areas. The first area is related to developing TGF (Penrose, 1959) into a clear framework that is both operationalizable and testable (Pitelis 2009, foreword to Penrose). The second area is in developing a more precise definition and a better understanding of how best to measure firm-level growth.

Looking first at the former. One method to overcome the lack of a framework of the theory of the growth of the firm (Penrose, 1959) is that proposed by Connell (2007), which is to try and uncover

the underlying, implicit theoretical framework developed by Penrose (1959), and convert this into a framework that can provide a basis for empirical testing. The framework developed by Connell (2007) suggests that the theory of the growth of the firm (Penrose, 1959) must be considered with 5 different input and output conditions. However, Conner (2007) does not provide a clear thread to link all of the five components together. This appears to go against the original ideas of Penrose (1959), who stressed the interconnectivity and “dynamic interaction” (Pitelis, foreward to Penrose, 2009) of the different elements of her theory.

Looking beyond Connell (2007), Blundel (2015) carried out a literature review of authors using Penrose's theory to identify the emergence of common themes. Although Blundel (2015) warns that different authors frequently put their interpretive focus on different parts of Penrose's theory (1959), Blundel (2015) does identify 6 core themes from Penrose's (1959) theory, which the author connects through a simple linear model, provided in Figure 4.

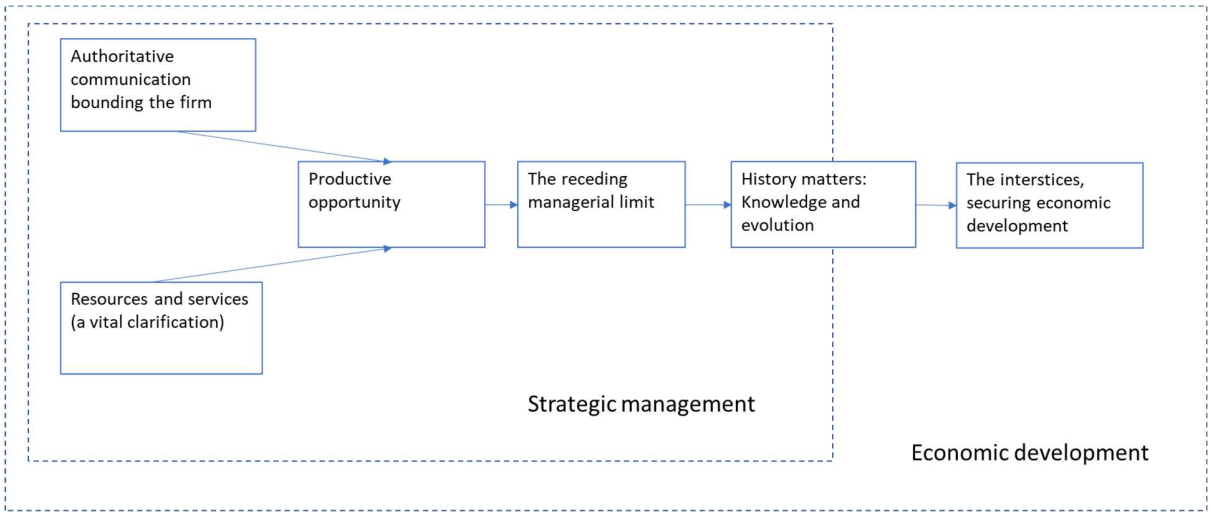


Figure 4 : The 6 key components of Penrose's (1959) theory and how they are connected (adapted from Blundel, 2015)

Blundel's (2015) framework helps to understand the bridge that Penrose's (1959) theory makes with strategic management (elements inside the firm) and economic development (elements outside the firm, the market), and also helps to link the key themes from the theory. It is also worth noting that Blundel (2015) positions the receding managerial limit at the heart of the framework, thus stressing the importance of the availability of management services as a key construct within TGF. However, unlike the work of Connell (2017), Blundel (2015) does not seek to understand the underlying drivers and influencers of each of the constructs identified.

It is concluded then, that although attempts have been made to translate Penrose´s initial TGF (Penrose, 1959) into a contemporary framework, no definitive nor widely accepted framework has yet been developed.

Looking next at how contemporary researchers have sought to provide clarity on how to measure firm-level growth, a problem with TGF that Penrose herself identified (as discussed in earlier sections).

Research by Davidsson et al. (2006) finds that researchers have used many options for measuring the size of firms and growth, but that the academic literature on firm size has put too little emphasis on how the different ways of measuring firm size affect the results of research and theoretical development. Interestingly, Davidsson et al., (2006) find a strong bias in the growth literature towards manufacturing firms. The authors found that of 55 published reports, 49% of empirical studies on firm size and firm growth were focused on manufacturing companies and only 4% on service companies, with the remainder not specifically looking at either. It is tentatively proposed that researchers often opt to focus on manufacturing firms rather than service firms, as the former have more tangible assets, such as factories and products and thus are easier to frame and research than service firms which often have more intangible business models and are often highly interlinked with other firms.

The two most common measures of growth in the academic literature are the number of firm employees and firm turnover (Davidsson et al., 2006). Of the two, firm turnover appears to be the most common financial measure of firm size, but there are several issues with using this measure (Atrill and McLaney, 2006). In particular, the authors point to the issue of revenue recognition dates. Atrill and McLaney (2006) provide the example of telecoms operators who lease network equipment. The authors raise the question of, if a network operator leases equipment for a 20-year period, should the full revenue be recognised when the equipment is leased or each month as the payment is made? This issue of revenue recognition date has recently caused a major financial issue for Rolls Royce (Hollinger, 2016).

The second common method, that of using the number of employees as a determinant of firm size and growth, is also popular amongst researchers. Evans (1987), Kumar et al., (1999) and Wernerfelt (2016) propose using the number of employees as the key determinant of firm size and growth, although each author does so for different reasons. Evans (1987) argues that measuring the number of employees is simply more reliable than using firm sales figures. Wernerfelt (2016) argues from the perspective of adaption cost theory that firm size is determined by the number of employees under direct control (via employment contracts) of the firm. Kumar et al, (1999) rely on Pashigian (1968) to argue that using employees to measure a firm's size has long intellectual traditions. Even if using the number of employees does have long intellectual traditions and may have been a useful measure in the past, it cannot be assumed that using the number of employees as a measure of firm size is relevant today. Consider, for example, firms

which are large in terms of revenues, profits, customer base or market capitalization, but through smart use of technology and/or the use of low employment business models, do not have a large number of employees. It is also worth pointing out that many firms today make use of subcontract workers, which can also skew any analysis using employees as a measure of firm size.

A practical example serves to demonstrate the different conclusions that can be drawn if the researcher uses the number of employees or turnover to measure firm size and growth. Facebook, a company with only 17,000 employees, generates revenue of $28bn (2016 Facebook annual report), whereas FedEx has more than 320,000 employees and generates revenues of $50bn (2016 FexEx annual report). Measured by employees, FedEx is 18 times larger than Facebook, measured by revenue, FedEx is just over half the size of Facebook. Thus, measuring the size of the firm only based on the number of employees generates a very different result from measuring based on this one financial metric of revenue. Measuring based on any other single financial measure, such as profit, cash flow or market capitalization generates similar results.

As the research and examples demonstrate, there are inherent problems with each measure of growth. Penrose (1959) avoids the difficulty by not explicitly specifying a measure of growth in her theory. However, as these examples demonstrate, the measure of growth selected has a major influence on the direction and application of any theory and any conclusions drawn from it. For example, those researchers considering the effect of production constraints are likely to focus on the economic output of the firm as a determinant of firm size, whereas those focused on understanding contracting cost constraints are more likely to use employee numbers (as the number of employees reflects the number of employment contracts the firm has secured). Unfortunately, Penrose's (1959) theory does not fully address these problems and the lack of a definition of how to measure growth is an important gap in Penrose´s (1959) theory. It is argued that this lack of clear definition in the theory on how to measure growth hinders the translation of the theory into the real world of business.

2.15 The theory of the growth of the firm: The situation today and existing gaps

The previous section has highlighted that contemporary researchers have focused on resolving two specific gaps that are identified in TGF (Penrose, 1959). To these two gaps, one must add the other critiques and gaps identified in TGF (see Section 2.11), and also consider any

contemporary research that has sought to address these gaps in TGF, even if the research did not specifically set out to address a gap in TGF.

All of the gaps identified in TGF (Penrose, 1959) as part of the literature review carried out for this research are summarised in Table 3. The table composes of three columns. In the first column, the gaps identified in Penrose's initial theory developed in 1959 are laid out. In the next column, any research identified that helps to address the gap identified is provided. In the third and final column, it is questioned whether gaps in knowledge remain today in the theory of the growth of the firm (Penrose, 1959).

#	Gap identified in Penrose's (1959) initial theory	Key contributions made to address the gaps in the subsequent years	Is the gap resolved today?
1	Although Penrose (1959) develops a theoretical argument (Connell, 2007) with many components, she does not develop the theory into an integrated framework that lays out the interactions between the components that can be readily used for empirical testing.	Subsequent authors have developed conceptual frameworks using Penrose's theory that facilitates empirical testing (Blundel, 2015; Connell, 2007; Rugman and Verbeke, 2002). However, no evidence is found of any researchers actually testing Penrose's theory (or the frameworks derived from it) and the conceptual frameworks developed by the authors above remain at the early stages of development.	No, there exists a significant gap in developing the theory into an agreed theoretical framework that can be applied and tested.
2	The theory provides no clear definition on how to measure growth.	Although Penrose (1959) helped to move the discussions away from measuring firm performance purely from a neoclassic profit performance perspective (Coase, 1937), if anything, this gap has expanded rather than been resolved by later researchers. Researchers such as Evans (1987),	No, an agreed and accepted method of measuring growth still remains.

		Davidsson et al., (2006) and Wernerfelt (2016) have looked at and considered different methods of measuring growth (revenue, profit, cash, employees, share price, assets) and since Penrose (1959), there has been a growing demand to measure firm performance beyond simple economic measures – taking into account for example environmental, social and people development factors Elkington (1998).	
3	Penrose (1959) makes the distinction between the "objective" productive opportunity of the firm, which is limited to what the firm is able to achieve, and the subjective productive opportunity which is what the firm thinks it can accomplish. The importance of this latter subjective view of the firm is also highlighted in Penrose application of TGF (Penrose, 1960), but TGF does not provide a means to understand how management attitudes and perceptions influence	Authors such as Porter (1991) have provided insight into the external conditions that can influence a firm behaviour. However, these were provided from an outside-in perspective, and not from the perspective of understanding how managers within the firm interpret those external factors. As indicated by Hoskisson et al. (1999), researchers tend to focus on internal factors or external factors, but no evidence is found of research looking to understand how firms interpret external market information, and how this interpretation of information leads to attitude formation and decision making within firms.	No, although Penrose identified that subjective perception of internal and external factors was a key determinant of management decisions, no evidence is found of researchers looking for methods to investigate these management perceptions and attitudes and their impact on firm behaviour and growth

	management decision making and thus firm-level behaviour.		
4	The theory suggests that existing internal resources have a bigger influence on the direction of the firm than external market forces. However, the theory does not fully explain in what way internal resources interact with external market forces to set the direction of the firm.	Similar to the above point, many researchers either adopt an inside-out perspective or an outside-in perspective (Hoskisson et al., 1999), but as yet no definitive and agreed upon theory exists to explain how internal stakeholders interpret and perceive the internal firm to which they belong or the external market in which the firm operates. Foss et al., (2008) do recognise the importance of understanding the mental models of managers and the subjective interpretations of the firm and the market, but do not offer a theoretical base with which to research them. The only evidence of a researcher looking to resolve this gap in Penrose (1959) theory is that of Blundell (2015), who does recognise that Penrose´s theory of the growth of the firm straddles the interaction between internal firm behaviour and the external market.	No, although RBV adherents have increased the focus on the internal resources of the firm, gaps remain to understand how the interaction between internal resources and the image of the external market interact to influence the behaviour of the firm
5	Penrose (1959) argues that experience and knowledge are positive contributing factors to firm performance, but does not consider that knowledge and	Penrose (1959) takes the assumption that experience and knowledge are a positive contributor towards growth (Penrose, 1959), however, two flaws exist to this assumption. The first is that young entrepreneurs, with little experience of market knowledge, are often able to create high growth companies, taking business away from large companies filled with experienced and knowledge managers	No, the relative importance of knowledge, and whether it has a positive or negative contribution to growth is not resolved.

	experience could also be a barrier to growth.	(consider the growth of Airbnb as an example). The second argument against this assumption is that knowledge can be an inhibitor to firm change (Alvesson and Spicer, 2012). As Penrose (1960) herself found when applying TGF in a case study, senior managers that have been successful in the past and built up knowledge-creating that success are more likely to be reluctant to adopt new ideas and therefore, they may miss opportunities for growth that more inexperienced managers may see.	
6	Penrose's theory (1959) and the frameworks developed upon it assume a linear model, where the end-result of the framework is growth. However, the theory does not explain how the market also influences management behaviours over time and how these management behaviours are influenced by market responses.	Those researchers who have developed and applied Penrose's (1959) theory appear to maintain the linear model proposed by Penrose, whereby growth is the endpoint of the model (Blundel, 2015). Increasing awareness of the importance of interconnectivity and interactivity, favoured by adherents to systems thinking type approaches (Senge, 2006), indicates that it is important to consider not just each individual component in any framework, but also the interconnectivity between the different components.	No, there is no clear conceptual framework which explains the interconnectivity and systems-level interactions of Penrose´s original theory.
7	Penrose's (1959) theory identifies that the availability of management services are the key constraints	Although the availability of management services is identified by Penrose (1959) as the key constraint to firm growth, most researchers have sought not to focus on this key constraint, but rather to expand the	No specific research has been identified which aims to understand

	to growth. However, the theory does not specify how to investigate and measure this key constraint.	investigation to look for other key resources within the firm. This is the essence of RBV (Barney 1991, Wernerfelt, 1984). It is argued that there has been little investigation into gaining a deeper understanding about the availability of management services, and how the availability of management services (measured in terms of time) can help to understand where in the firm management services are constrained. The importance of management time and how time is spent is highlighted by both Drucker (1967) and Porter and Nohria (2018). However, although both highlight the importance of management time, neither propose a means to understand how that time allocation influences overall firm behaviour, nor firm-level performance.	management time as a constraint to growth. Moreover, no evidence is found of theoretically grounded research that aims to investigate how the allocation of management time influences firm-level behaviour and firm performance.

Table 3 : Gaps identified in Penrose´s (1959) theory of the growth of the firm

With Penrose's (1959) theory now fully explored, gaps in the initial theory identified, and an exploration of how contemporary authors have looked to fill the gaps, the next section brings together the conclusions drawn from existing literature on the theoretical insights explored and identified in this chapter.

2.16 Discussions and concluding remarks on literature review

This chapter has provided a holistic view of different theories related to the firm. In doing so, the chapter has demonstrated that there are a number of theoretical perspectives that can be used to investigate firms. Specifically, the chapter identifies four possible theoretical perspectives (macro, economic, strategic and individual subjective) that can be used to investigate firms. Such a holistic view generates the question of which is the most appropriate theoretical perspective to investigate the behaviour of a firm that seeks to grow. This chapter considers this broad question, but rather than argue for and against each and every different theoretical perspective available, the chapter uses a process of elimination to determine that a strategic level perspective is the most appropriate theoretical perspective to initiate an investigation into firm-level behaviour.

This chapter then considers one of the most widely used strategic level theoretical perspectives, that of RBV (Barney, 2001; Wernerfelt, 1984). The chapter argues that Penrose´s (1959) TGF is distinct from RBV in several ways, and in particular in terms of the start and endpoints of the two theories. As a result, this chapter proposes that TGF can be considered as a distinct theoretical alternative to RBV as a means to understand firm-level behaviour.

Drawing on recent critiques of RBV highlighted by Kraaijenbrink et al. (2010), this chapter then argues that TGF stands up against these critiques of RBV. In particular, this chapter argues that resource-based researchers have increasingly focused their investigations into the wider topic of firm-level resources, but overlooked Penrose´s (1959) key insight that availability of management services is the key resource to be investigated. Consequently, it is argued that it is necessary and appropriate in this research to return to Penrose's (1959) original theory of the growth of the firm as a theoretical basis for this research.

In particular, this chapter proposes a return to Penrose´s (1959) original key insight that the availability of management services is the key to understanding firm-level behaviour. Although Penrose (1959) does not provide an operational measure to investigate the availability of management services, it is logical to propose that availability of management time is an appropriate measure to be used as a proxy for the availability of management services, as firms effectively pay for the time that managers provide to the firm. As such, this research proposes that a focus on the availability of management time is a more practically researchable concept than Penrose´s (1959) focus on the availability of management services, as in essence availability of management services and availability of management time both refer to one and the same

thing. From this, it is proposed that an understanding of how firms make use of available management time as they seek to grow will provide new insight into firm-level behaviour.

Despite this argument for a return to Penrose (1959) initial theory of the growth of the firm, this chapter also identifies several gaps in the theory. In particular, two key gaps are identified. Firstly, that TGF lacks a framework that can be used to apply and test the theory and secondly, that considerably ambiguity remains about how to measure firm-level growth. It is on further investigation into TGF (Penrose, 1959) and the underlying assumptions that underpin it, that several additional gaps are identified in the theory. These gaps are presented and summarised in the chapter.

Moreover, Penrose´s assumption that the firm is best considered as a collection of individuals working together to do something (Penrose, 1959) leads to the idea that a deeper understanding of the attitudes and behaviour of the individuals who direct and govern the firm (in other words, the central managers of the firm) will provide deeper insight into the behaviour of the overall firm. Such thinking about the behaviour of certain individuals within the firm opens up the possibility of creating a link between two of the four theoretical perspectives explored at the start of this chapter, namely the individual subjective perspective and the strategic perspective. Penrose (1959) does recognise this potential link but describes the investigation of individual attitudes as a slippery concept that is difficult to research, and hence Penrose (1959) does not explore the link further. This research does seek to explore this link further and does seek to develop a bridge between the strategic and individual behavioural perspectives, and it does through the development of a new conceptual framework, explained in the following chapter.

3 Development of the ATBV conceptual framework

As highlighted by Wells and Nieuwenhuis (2017) the interaction between theory building, data acquisition and engagement with industry is often convoluted, intermittent and non-linear. Consequently, it can be difficult to separate the data acquisition stage with the theory-building stage. However, the conceptual framework developed in this research is derived mainly from existing theory and literature and particularly TGF (Penrose, 1959), and thus it is presented at this stage in the research. The chapter begins by developing Penrose´s (1959) initial ideas into a conceptual framework. From this, it is possible to better highlight the gaps identified in the previous chapter that this research aims to address. With the gaps highlighted, the remainder of this chapter seeks to address these gaps, with the development of a new conceptual framework.

3.1 Developing Penrose´s initial theory into a conceptual framework

The interpretations of Penrose's (1959) TGF, developed by Blundel (2015) and Connell (2007) and referred to in early sections of this research are used as a starting point for the development of the conceptual framework for this research. Using ideas from both authors and from Penrose's original theory (1959), the initial conceptual framework developed for this research is provided in Figure 5.

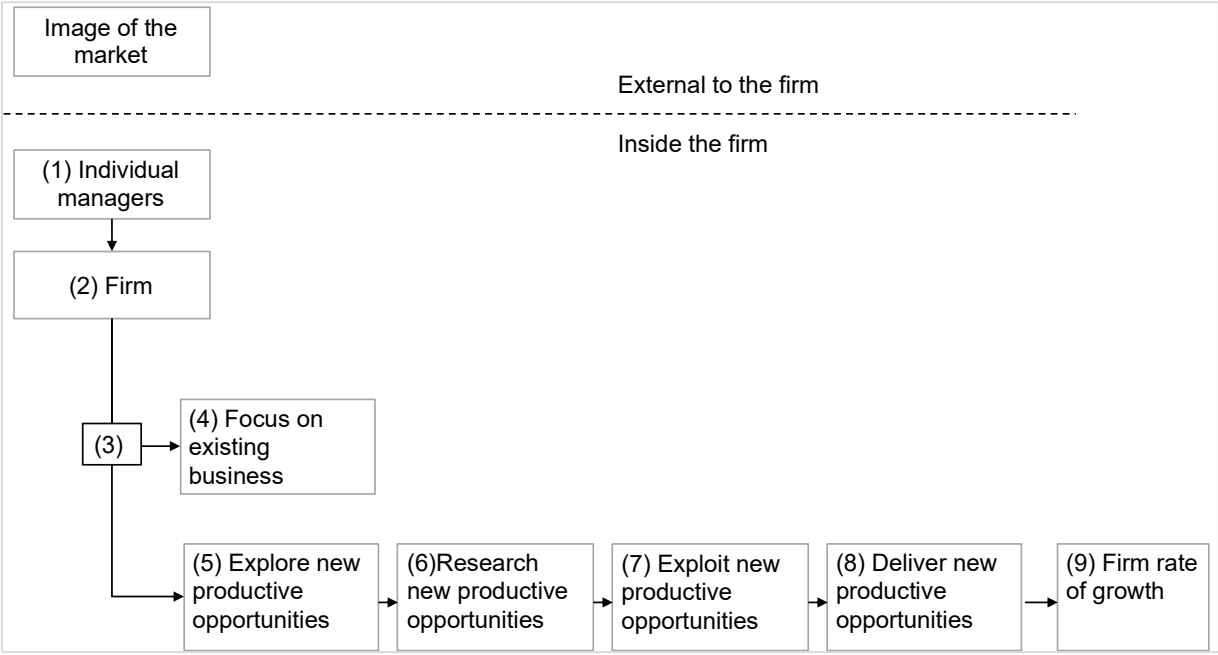


Figure 5 : Framework of Penrose's (1959) theory of the growth of the firm, used as a start point in this research (authors own interpretation).

This framework aims to represent Penrose's (1959) initial theory into a conceptual framework, which is then used as a base for the development of a new conceptual framework for this research.

The framework begins with (1) the individual managers within the firm. This is in line with Penrose who states that "any analysis of the growth process must begin at the internal firm-level (Penrose, 1959: pg 42). Moreover, the conceptual framework incorporates Penrose (1959) view that that the individual managers within the firm are the key starting point for the theory, as it is the individual managers´ perceptions or "image" of the external market, their intrinsic motivations, decisions and behaviours that have the largest influence on the growth of the firm (Blundel, 2015).

As highlighted by Penrose (1959), one cannot assume that individuals within the firm are focused solely on growth or profit, and thus, an understanding of individual motivations and objectives is key to understanding how the wider firm behaves. Although this is recognised by Penrose (1959) and is included in the framework, Penrose (1959) does not offer a clear way for researchers to understand the individual motivations and behaviours. This gap is returned to later in the chapter.

The next step in the framework (2) indicates that individual managers combine as an authoritative administration group to form a firm (Blundel, 2015) and that the firm is made up of a bundle of resources, of which management services are the key resource.

From here, as outlined by Penrose (1959) and Connell (2007), the firm has a choice to make: whether to focus management services (or, more specifically, management time) on the existing business or whether to make use of entrepreneurial services and explore new productive opportunities (3). This decision is at the heart of Penrose's theory and according to Foss (Foss, 1999) is the key concept in the theory. Thus, the above framework can be used to highlight this management decision and concept within the theory. If the firm allocates all management services to run the existing business (4), then no time will be spent looking for new productive opportunities (5). Thus, if a constraint exists on management time and all management time is used in (4), then no time is available to look for new productive opportunities (5) and thus one can assume, it is unlikely any new productive opportunities will be discovered.

Next, assuming that the firm does want to explore new productive opportunities and has the management capacity to do so (5) this raises the question of how firms do that. It is hypothesised that just deciding that the firm is open to explore new productive opportunities is not sufficient, it must have some way to identify potential productive opportunities. This step is reflected in step (6) in the conceptual framework. Next, even if the firm identifies a productive opportunity, one must consider whether it has the desire and means to exploit the opportunity (7). This raises the question of how firms assess whether to pursue the productive opportunity and also how they assess whether the firm has the means to exploit it. This is considered by Penrose (1959), who argues that the constraint to exploit an opportunity is purely a matter of firm management´s subjective assessment of the productive opportunity.

Returning to the final steps in the framework in Figure 5, the framework shows that if the firm can move through all of the steps to be able to exploit the identified new productive opportunity (7), it remains to be considered whether the firm can exploit and deliver a new productive opportunity (8) and deliver firm-level growth (9) from it.

The intention of creating a framework to represent Penrose´s (1959) theory (as shown in Figure 5) is to allow this research to use Penrose´s initial theory (Penrose, 1959) as a start point on

which to build a new conceptual framework for this research. Thus, the next section uses the framework in Figure 5 to highlight areas that require further development. It is argued that three main gaps are identified from the framework:

a) How to measure growth? The framework does not define how to measure the rate of growth (9).
b) How and where does management time constrain firm-level growth? Penrose (1959) argues that management time is the main constraint to firm growth, but the theory does not provide a means to identify how and where in the firm the management time constraint is located. Thus, the gap identified is how to identify where the management time constraint within the firm is located (4, 5, 6, 7 or 8).
c) How does individual management behaviour influence firm-level behaviour? The framework does not explain how to explore individual manager behaviour, and what are the antecedents to that individual behaviour (1) and how the individual behaviours work collectively within the boundaries of a firm to set the direction of the firm (2).

Each of these gaps is expanded on below, before proposing a new conceptual framework that aims to address all three gaps in the subsequent section.

a) How to measure growth?

The lack of clarity on how to measure growth is a weakness already highlighted in a review of Penrose´s (1959) theory. Using the framework from Figure 5 allows this weakness to be explored in more detail. Penrose (1959) recognises that there is a trade-off between focusing management time on (4) existing business and focusing management time on looking for (5) new productive opportunities. In fact, this is at the heart of Penrose´s (1959) theory and represented in (3). Despite this, Penrose (1959) does not make the link that a change in the allocation of management time between (4) and (5) may result in different types of growth. It is proposed here that if management time is focused on existing business (4), the most likely output is that profits will grow, but it is unlikely that revenue would grow. Alternatively, if management time is focused on looking for new productive opportunities (5), the most likely output is that revenue will grow, but this focus on top-line growth may result in a short-term contraction of profit from existing business. This possible trade-off is not considered in Penrose´s initial theory but is considered in the newly developed conceptual framework developed for this research. Before providing the

newly proposed conceptual framework, the second gap identified in Penrose´s (1959) theory is further explored.

b) How and where does management time constrain firm-level growth?

Penrose (1959) highlights that the theory of the growth of the firm is not just about why firms grow, but also an exploration of the restrictions to the rate of growth.

A theory of the growth of the firm is essentially an examination of the changing productive opportunity of firms; in order to find a limit to growth, or a restriction on the rate of growth, the productive opportunity of a firm must be shown to be limited in any period. (Penrose 1959, p. 31–2)

Penrose (1959) argues that the availability of management services is the key constraint to growth. What Penrose (1959) does not provide is a deeper understanding of where the constraint on management services may occur inside the firm. Referring to Figure 5, it can be argued that management services may be constrained in different areas of the firm, for example, there may be a lack of management services available to look for new productive opportunities, but equally, there could be a lack of management services available to exploit the productive opportunity.

The third identified gap, related to gaining an understanding of how individual manager decision making and behaviour can impact firm-level behaviour and growth, requires deeper consideration and explanation. This is considered next.

c) How does individual management behaviour influence firm-level behaviour?

Penrose (1959) recognises the importance that individual manager attitudes and motivations may have on the direction and growth of the firm and recognises that it cannot be assumed that all managers are motivated purely to pursue a growth in profits. This is particularly apparent when Penrose applies her theory at the Hercules power plant (Penrose, 1960). As Penrose (1959) explains, some managers may be motivated by “building an empire” or others just by “winning the game” (Penrose, 1959). A manager who is interested in building an empire may be more interested in hiring and retaining employees, a manager who is more interested in “winning the game” may be more interested in gaining business (revenues) ideally at the expense of a

competitor, whereas a manager interested in increasing personal wealth may be interested in boosting market capitalisation or increasing profit targets to achieve bonus remunerations.

Although it could be argued that all managers are aiming to do all of these things, Penrose´s (1959) theory provides no means to explore the link between the attitudes of the individual managers (the start point of the framework) and the level of growth achieved (the endpoint of the framework). Thus, this link between the individual managers' attitudes (start of the framework) and the output (level of growth achieved) is lacking in Penrose's theory (1959). Thus, it is argued that one of the major gaps in Penrose's (1959) theory is that, although it recognises the importance of different attitudes and motivations of individuals inside the firm, Penrose's theory does not provide a means to understand how the attitudes and motivations of these individuals affect the overall behaviour of the firm. To overcome this, it is proposed to complement Penrose's (1959) initial TGF with established theoretical views from the field of individual behavioural psychology. In particular, it is proposed to draw on established theories related to the understanding of individual attitudes and their impact on behaviours as a means to complement Penrose's (1959) theory and provide deeper understanding on how the attitudes of individual managers can lead to different firm-level behaviours.

3.2 The theory of planned behaviour as a complement to Penrose´s initial theory

The theory of reasoned action, initially developed by (Fishbein and Ajzen, 1977) and later enhanced into the theory of planned behaviour (Ajzen, 1985, 1991) is proposed as the theoretical basis to understand individual manager attitudes as precursors to their behaviours. The theory of planned behaviour is pictorially represented in Figure 6.

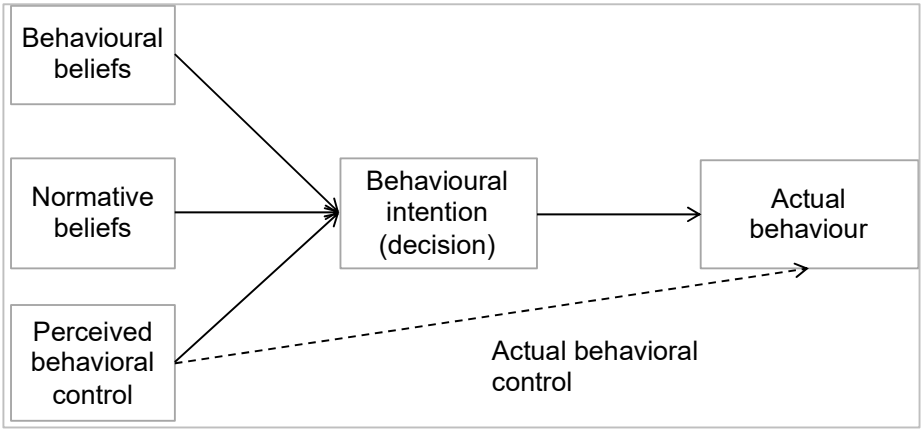


Figure 6 : Theory of planned behaviour (adapted from Ajzen, 1991)

The theory of planned behaviour (Ajzen, 1991) is often applied as means to understand how beliefs drive attitudes that then lead to actual behaviours, and to investigate how a change to these beliefs and attitudes can lead to individuals adopting different behaviours. The theory of planned behaviour (Ajzen, 1991) proposes that human behaviour is guided by three main considerations: beliefs about the likely outcomes of the behaviour (behavioural beliefs), beliefs about the normative expectations of others and the motivation to comply with these expectations (normative beliefs), and beliefs about the perceived behavioural control of being able to perform the outcomes (perceived behavioural control beliefs). The aggregate of these beliefs creates a favourable or unfavourable attitude towards the action and leads to the formation of a behavioural intention. In general, the more favourable the attitude to perform the behaviour in question and the degree of actual control the individual has of performing that behaviour, the more likely it is that the individual is likely to carry out that behaviour. Thus, as outlined in Figure 6, the theory proposes that actual behaviours are mediated by behavioural intentions, and behavioural intentions are mediated by an aggregate of behavioural beliefs, normative beliefs and perceived behavioural control.

Although the use of the theory of planned behaviour is widespread (Conner, 2020), it is not without its critics. In particular, Sniehotta et al., (2014) argue that some of the theory's propositions are patently false and that the theory is empirically and conceptually indefensible. However, it should also be noted that these criticisms were related to the specific performance of the theory when seeking to change health-related behaviours. Moreover, many of the criticisms provided by

Sniehotta et al., (2014) were rebuffed and rejected by Ajzen (2015), who points out that the theory of planned behaviour is not a theory of behavioural change, but rather a theory that can help to explain and understand people's intentions and behaviours through a deeper understanding of their attitudes and beliefs. Furthermore, as Ajzen (2015) points out, despite the criticisms of the theory of planned behaviour provided by Sniehotta et al., (2014), Sniehotta et al., (2014) do not provide evidence of a viable or improved alternative. Thus, although it is acknowledged that critiques of the theory of planned behaviour exist and that the theory is far from proven to be perfect, the theory remains as one of the most widely used and accepted theories available to provide an understanding of human behaviour (Ajzen, 2015).

Thus, it is argued that, the theory of planned behaviour (Ajzen, 1991) provides a strong theoretical basis to understand planned behaviour, and in line with the theory of planned behaviour (Ajzen, 1991), this research uses the theory to assume that the aggregate attitudes and decisions of individual managers inside a firm are the key antecedents to the overall direction of the firm and ultimately the rate of growth of the firm (Penrose, 1959).

In this research then, the established theories of the growth of the firm (Penrose, 1959) and components from the theory of planned behaviour (Ajzen, 1985, 1991) are combined to create the key mechanisms that form the theoretical basis for this research. This theoretical basis is provided in the form of a conceptual framework, explained in the following section.

3.3 Newly developed conceptual framework: Attitude and Time Based View (ATBV)

In the previous sections it has been argued that the key insight of the theory of the growth of the firm (Penrose, 1959) is that the availability of management services is the key determinant and constraint to firm-level growth. It has also been argued that despite this insight, Penrose (1959) does not provide any clear theoretical or conceptual framework to illuminate the links between this key constraint and how it ultimately influences firm-level growth. Furthermore, although Penrose (1959) highlights the important constraint of availability of management services, she does not provide a means to investigate the constraint in detail, nor seek to understand how firms behave as they seek to alleviate the constraint in an attempt to grow the firm.

To address these gaps, this research proposes to use management time as the measure of "availability of management services", the term used by Penrose (1959). The purpose of this is to facilitate research and translate Penrose´s (1959) theoretical concept of "availability of management services" into the more practically observable notion of "availability of management time". As such, whereas Penrose (1959) argues for a focus on understanding of availability of management services, this research translates this into a focus on understanding of availability and use of management time. Availability of management time is therefore at the heart of the new conceptual framework proposed in this research.

Thus, Penrose´s key proposition that:

"all expansion must draw on some services of the firm's existing management and consequently the services available from such management set a fundamental limit to the amount of expansion that can be either planned or executed even if all other resources are obtainable in the market" (Penrose, 1960 pg 3).

This is rephrased in this research to specify that

"all expansion must draw on some services of the firm's existing management time and consequently the management time available from existing management sets a fundamental limit to the amount of expansion that can be either planned or executed even if all other resources are obtainable in the market"

Following this proposition that an understanding of the availability of management time is the key to understanding constraints to firm-level growth, this research also posits that to understand how management time is used inside a firm, one must understand how decisions related to the use of management time are made inside the firm. In this research, it is proposed that management attitudes are antecedents and predictors of how management time is used. Consequently, an understanding of management attitudes within the firm is also a key element of the new conceptual framework.

Because of the importance placed on management time, and the management attitudes that influence how management time is used, the name selected for the conceptual framework

developed in this research is the Attitude and Time Based View (ATBV). The conceptual framework is provided in Figure 7.

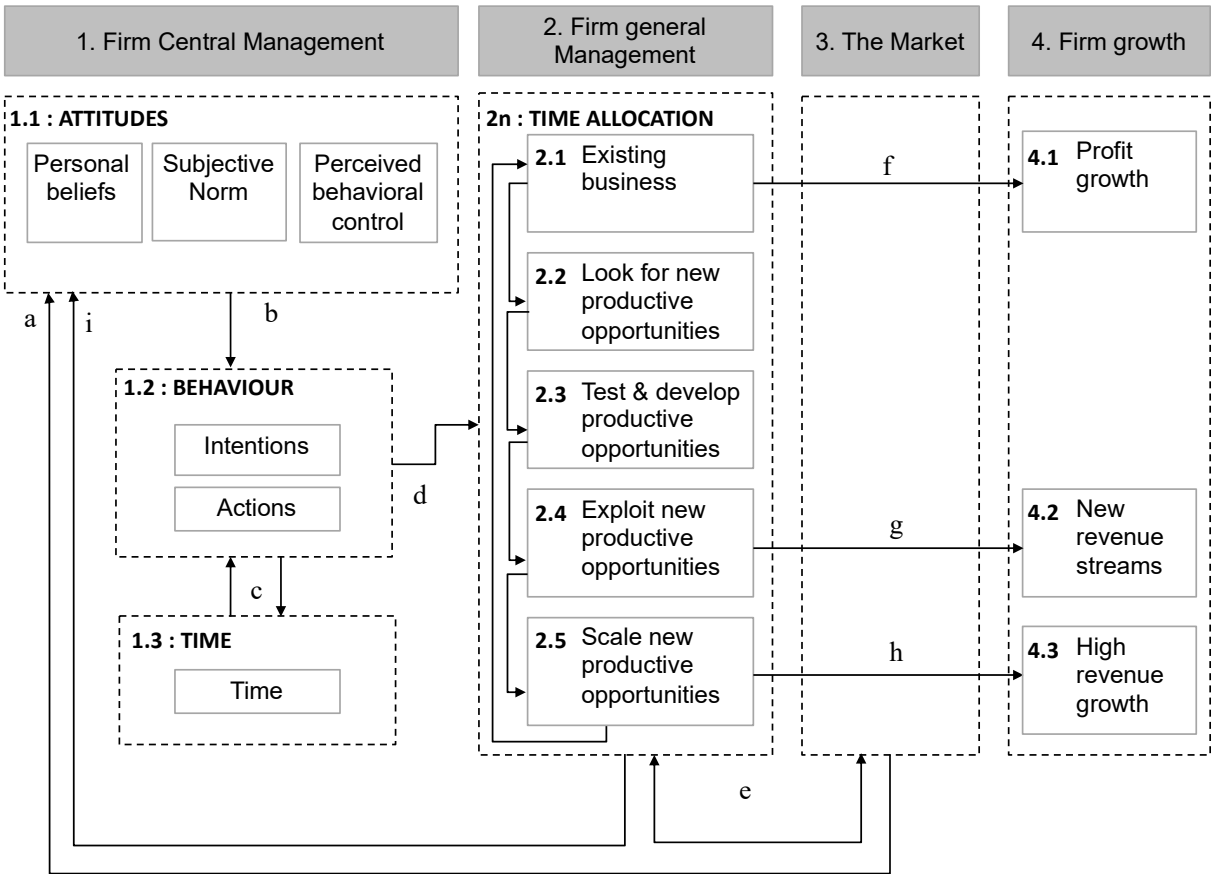


Figure 7 : Conceptual framework of the Attitude and Time Based View (ATBV) (created by author)

This new ATBV conceptual framework incorporates the key insights from Penrose's (1959) theory of the growth of the firm but translates the insights into a new conceptual framework that can be used to investigate how firms behave and seek growth through the identification and pursuit of new productive opportunities.

In the following paragraphs, the ATBV conceptual framework is explained, beginning with an explanation to the four major pillars which are represented at the top of the conceptual framework:

1. Central management

2. Firm general management
3. The market
4. Firm growth

Although Penrose (1959) refers to management services, the new conceptual framework proposes to create a clearer distinction between two types of available management services. The first group is defined as central management (1), a term used by Penrose (1959) and which represents the management services that act as administrative controllers of the firm who ultimately control and set the direction of the firm.

The second group is defined as firm general management (2). These management services refer to any manager inside the firm who is not part of the central management group. This general management group may contain managers at different levels, including senior managers (but not part of the central management group) to lower-level managers who are running specific parts of the business.

Together, (1) central managers and (2) general managers make up the management services available to the firm referred to in Penrose´s theory of the growth of the firm, and their available time represents the management constraint that Penrose's places at the heart of the TGF. Both the central management and firm general management are internal to the firm. It may be questioned why only central management attitudes and behaviour are considered in the ATBV framework, and not the attitude and behaviour of general managers. The rationale for this is that although general managers of course do develop attitudes and behaviours that influence the firm, it is only central managers who have the ability and power to define a firm-level strategy. As such, if only central managers are able to decide on firm-level strategy, it is therefore logical to focus on understanding the attitudes and behaviours of these central managers.

Unlike elements (1) and (2), the market (3) represents an element that is external to the firm. This includes customers, suppliers, competitors, governments, universities and any other stakeholder which is not in the direct employment of the firm. Lastly, (4) firm growth is the output of the conceptual framework and what this research aims to predict.

At a high level, the ATBV framework proposes that (1) central management attitudes influences the allocation of (2) overall general management time in the firm and that the allocation of this management time impacts firm growth (4), but this mediated by the market (3).

This placement of the market (3) between the internal behaviour of the firm (1) and (2) and firm growth (4) is deliberate and forms an important clarification within the theory of the growth of the firm (Penrose, 1959). Although others have argued for measuring growth in terms of fixed assets (Penrose, 1960) or the number of employees (Wernerfelt, 2016) such arguments place the emphasis on measuring growth in areas that the firm can control. A firm can, for example, decide to hire more employees or purchase fixed assets. In contrast and as proposed in the ATBV conceptual framework proposed here, it is argued that the market is an important mediator of firm growth, and that firm growth should be measured by market-determined numbers such as revenue and profit, not internally controllable variables such as fixed assets or the number of employees.

Under each of the four pillars, more detailed mechanisms are identified and numbered hierarchically. Thus, a mechanism that forms part of the pillar (1) firm central management, is numbered 1.1 or 1.2. A mechanism that forms part of the pillar (2) contains multiple elements, represented as 2n, with each individual mechanism numbered 2.1, 2.2 and so on.

The flows linking the different mechanisms are represented with the letters a to i. First, each of the numbered mechanisms is explained in more detail under the heading of each of the pillars, before then explaining in more detail the connecting flows (a to i)

1) Firm Central Management

The ATBV framework suggests that central managers interpret information from the market (a) and from the firm (i) and use that information to develop personal attitudes, and act (or not) on those attitudes considering their personal beliefs, subjective norms and level of perceived behaviour control (see mechanism 1.1: Attitudes). This is in line with the theory of planned behaviour (Ajzen, 1985) explained in earlier chapters.

From the creation of the attitudes in mechanism (1.1), the central managers create an attitude towards certain productive opportunities available to the firm. It is proposed that the attitude

towards these particular productive opportunities will influence the behaviour of those central managers, both in terms of how much time central management time is spent considering the productive opportunity (1.3) and whether the central managers elect to introduce the productive opportunity into the rest of the firm through their actions (1.2).

Thus, the link is made here between central management attitudes towards a potential productive opportunity (1.1), and the amount of time that is spent on it by central managers (1.3) and the decisions and actions that central managers make that impact the rest of the firm (1.2). For researchers, measuring and investigating central management attitudes (1.1) in an objective, quantifiable way is notoriously difficult. However, observing and measuring how much central management time is spent on a particular productive opportunity (1.3) and observing the (1.2) behaviour and actions of central managers allows researchers to begin to gain an understanding of central management beliefs and attitudes.

The ATBV conceptual framework seeks to provide deeper insight into how and where firm-level growth is constrained. As such, it is proposed that the framework can be used as a means to understand where growth is constrained in the firm. To illustrate, it is proposed that having no central management time available (1.3) to review new productive opportunities indicates that the management time is constrained at (1.3) and that no new productive opportunities will be considered by the firm's central management team. Thus, the availability of central management time (1.3) is identified as the first potential point of management time constraint. Such a proposition is in line with, but more specific than the original theory of the growth of the firm (Penrose, 1959).

Next, it is posited that if central management time is available at (1.3) to pursue a productive opportunity, that the next possible area of constraint is the availability of productive opportunities for central managers to consider. If there are no productive opportunities for central managers to form attitudes about (1.1), then the next constraint is achieved and no new productive opportunities will be pursued by the firm.

Following this, assuming that central management time is available and there are productive opportunities available for central managers to consider, the next potential constraint is central management attitudes (1.1) towards specific productive opportunities. If no productive opportunity exists to which central management has a positive attitude, then it is proposed that no new

productive opportunities will be pursued by the firm. Alternatively, if central management does have a positive attitude (1.1) towards a new productive opportunity, then that productive opportunity is likely to result in intentions and actions (1.2) from central management to pursue that opportunity at a firm-level.

It is proposed in the ATBV framework that actions from (1.2) central managers will influence (2.0) firm general management time availability, the next pillar in the ATBV conceptual framework

2) Firm general management

At this level of analysis, the ATBV framework no longer seeks to understand individual central manager attitudes as in pillar 1.0 but instead seeks to understand how general managers inside the firm allocate their time and how this can serve as a constraint to firm-level growth.

An explanation of the elements of (2) firm general management time allocation can be best illustrated using extreme examples. At one extreme, one can imagine a firm with no existing business or customers. In this case, no general management time is needed to focus on existing business (2.1) and firm general managers can spend all of their time looking for and exploring new productive opportunities (2.2 to 2.5). At the other extreme, firm general management spend all of their time on existing business (2.1) and allocate no time to look for new productive opportunities (2.2 to 2.5). Between these two extremes, firm general management can split their available management time across the different time allocation mechanisms (2.1 to 2.5). Understanding how firm general managers allocate their time and in which of the mechanisms (2.1 to 2.5) is a key focus for the ATBV conceptual framework. As such, the mechanisms 2n are provided in sequential order, as it is argued that the management time constraint can occur in any one of the mechanisms, and a management time constraint in one of the mechanisms constrains the firm from spending time on the next mechanism. To illustrate using an example, the ATBV framework proposes that if all management time is used in mechanism 2.1 to 2.4, this would result in no management time being available for mechanism 2.5.

It is also reflected in the conceptual framework that once the firm begins to deliver and exploit new productive opportunities (2.5), these productive opportunities will eventually turn into (2.1) “existing business”, and once this is the case, managing this “existing business” will now place a

demand on existing management time (2.1). Thus, in line with the systems thinking approach (Senge, 2006), the ATBV conceptual framework is circular in design, not linear.

The ATBV conceptual framework is proposed as a way of delving deeper into Penrose's (1959) argument that the availability of management time is the key constraint to firm growth. The framework allows researchers and firms to identify at what stage (or mechanism) in the conceptual framework the management constraint may be occurring. Such an understanding can help to gain a deeper insight into how different firms allocate different levels of management time to different mechanisms, and in turn how this influences firm-level growth. Also, the conceptual framework can be used by firms to understand where additional management capacity (time) is required. Additional management capacity can be obtained either through recruitment of new managers, hiring of consultants or finding resources from other firms or organisations such as suppliers or universities. Adding management capacity where there is no constraint is a waste of resource, and as such, adding extra management capacity to (2.5) for example, to scale new productive opportunities, would be pointless if the constraint is that not enough management time is available to (2.2) look for new productive opportunities.

It is also highlighted in the conceptual framework that the feedback from (2) general managers as they allocate their time in different mechanisms (2.1 to 2.5) can continue to influence the attitudes of the (1.1) central management team. Thus, the conceptual framework is not static; there is a constant and regular interaction between the different mechanisms.

Consider for example those firm general managers (2) who spend time testing and developing new productive opportunities (2.3). These managers may feedback (formally or informally) to the firm´s central management (1) that the outcome of their time spent on pursuing one productive opportunity is becoming excessive or producing poor results. This feedback may influence the attitude of the (1) Central Management and lead them to change their (1.1) attitude towards the productive opportunity and decide that less management time should be spent on the particular productive opportunity.

The management time allocation decisions within pillars (1) and (2) represent the central crux of the research challenge and reflect the key argument proposed in Penrose's theory of the growth of the firm, that management time is the key constraint to firm growth. However, the pillars (1) and

(2) must be considered within the wider conceptual framework, the remainder of which is explained in the following section.

(3) The market and (4) firm growth

These two elements are presented together as they are highly interrelated. It is proposed that the decisions made on the allocation of management time in pillars (1) and (2) influence (4) firm growth, but that this influence is mediated by (3) the market.

To first explain the proposed link between (1) and (2) and the impact on firm growth (4), the link is first explained assuming no mediation by the (3) market. The ATBV framework proposes that all other things being equal, if all management time is spent on (2.1) existing business, then the most likely outcome is an increase of growth in (4.1) firm profit from the existing business. The downside of allocating all management time to (2.1), the existing business, is that it is proposed that no management time will be available to look for, test or exploit new productive opportunities (2.2 to 2.4). In this case, no new growth will be achieved from the exploitation of new productive opportunities (4.2)

Conversely, if management time is allocated to (2.2), (2.3) and (2.4) then the outcome, as new productive opportunities are identified, developed and exploited, is the creation and growth of (4.2) new revenue streams for the firm.

However, if all management time is spent on (2.1), (2.2), (2.3) and (2.4), with no management time allocated to (2.5), then the ATBV framework proposes that the firm will not achieve (4.3) high revenue growth.

The purpose of splitting (4) firm-level growth into three types (4.1), (4.2) and (4.3) is to address the gap in the theory of the growth of the firm (Penrose, 1959) on how to measure growth. As discussed in earlier sections, Penrose (1959) does not provide a clear means to define how growth should be measured when applying the theory and argues that profit and sales growth are one and the same thing. In contrast, the ATBV conceptual framework proposes three different types of firm growth (4.1), (4.2) and (4.3), and aims to create a link between how firms allocate and use management time and the different types of firm-level growth that can be expected from the different allocation of management time.

The previous paragraphs have sought to explain how the use of management time in pillars (1) and (2) can result in different types of firm growth in pillar (4). However, the ATBV framework proposes that the result observed in pillar (4) is mediated by (3) the market. This proposition also aims to clarify a gap in the theory of the growth of the firm (Penrose, 1959). The ATBV framework proposes that firm growth should be measured by elements that are mediated by the market, such as revenue and profit, and not elements that are under the direct control of the firm (such as the hiring of employees of acquisition of fixed assets).

In the previous paragraphs, each of the pillars within the new ATBV conceptual framework has been described. With this done, it is now possible to explain in more detail the interconnection of the different mechanisms, labelled (a) to (i) in the ATBV conceptual framework.

1) Interconnections of the different mechanisms (a) to (i)

Although some of the interactions have been briefly discussed in the previous section, this section provides more details of the interactions and flows between the mechanisms in the ATBV conceptual framework.

The conceptual framework proposes that central managers develop attitudes based on information received from external sources to the firm (the market), this is represented by information flow (a) and also from internal sources within the firm, represented by information flow (i) in the ATBV framework. These information flows can be categorised under the terms internal and external inducements and obstacles proposed by Penrose (1959) but with the ATBV framework, these internal and external inducements and obstacles are now specifically linked to their influence on central management attitudes (1.1).

It is noted that when central management receive this information via (a) and (i), their attitudes are not shaped from a blank slate. In fact, individual attitudes are built over a lifetime and evolve and change as new information is received, processed and interpreted. Thus, the information flow (a) and (i) may serve to challenge or re-enforce the existing attitudes of central managers or may serve to create completely new attitudes. This flow of information via (a) and (i) may come in many forms, including information received via formal and informal methods, during work and outside of work hours, and via many different mediums with which information can be shared.

This thinking is in line with Penrose (1959), that the research focus should not be on the flow of information itself, but rather on the subjective interpretation of that information by the firm, and specifically for the ATBV framework, the subjective interpretation of the information by firm central managers. To more specifically link the ATBV framework to the theory of the growth of the firm (Penrose, 1959), information flow (a) in the ATBV framework represents what Penrose describes as the firms´ "image" of the market. In the ATBV framework, this "image" of the market is more clearly defined as the flow of information between the market and the central managers and even more specifically, an understanding of how central managers subjectively assess the information received from the market and develop attitudes from the information received. Information flow (i) in the ATBV framework represents what Penrose (1959) describes the firm´s perception of itself. For the ATBV framework, this is represented as the central managers' perception and interpretation of the firm in which they work.

Flow (b) in the ATBV conceptual framework represents an internal cognitive step that the individual central manager takes. As the information from the market and from within the firm is received and processed, it is proposed that individual central managers develop beliefs and attitudes (1.1) and based on these attitudes develop the intention to do something (1.2).

Flow (c) represents a step, whereby based on the individual central managers' attitudes towards a specific productive opportunity (1.1), the individual central manager decides whether to spend time on the productive opportunity or not. This flow is considered in the ATBV framework as it is proposed that the amount of time spent on a productive opportunity is a quantifiable factor that can be observed by researchers and is one external representation of the attitude of the central manager towards the productive opportunity. The amount of time spent on the productive opportunity may then lead to intentions and actions (1.2), hence the return of flow (c) back to mechanism (1.2). Once time is spent by the individual central manager considering the new productive opportunity, the next step, represented by the return flow (c), represents an internal step, whereby individual managers translate their attitudes into explicit behaviours and actions. Like the amount of time used by central management in (1.3), these behaviours and actions in (1.2) can also be observed by researchers and also represent an external representation of the central managers' attitudes.

Flow (d) represents the flow of information between the central management team and the wider firm general management team. Flow (d) can contain explicit information, such as central

management providing managers with explicit tasks to be done, but it can also contain implicit and indirect information that flows from central managers to general managers inside the firm.

Flow (e) represents the flow of information between the firm and the market. In line with the ideas of Penrose (1959), the actions of the firm can influence the market, as well as the market influencing the actions of the firm. Consequently, the flow is represented as bi-directional.

Flow (f) represents a proposed causal link. It is proposed that by spending more time on the existing business (2.1), the most likely impact is on profit growth.

Flow (g) represents a causal link. It is proposed that as new productive opportunities are exploited (2.4) the most likely impact is the creation of new revenue streams (4.2)

Flow (h) represents a causal link. It is proposed that as more time is spent scaling new productive opportunities, the most likely impact is on high revenue growth (4.3)

Flow (a) and (i) already briefly discussed, also introduce a system thinking (Senge, 2006) approach into the ATBV conceptual framework. This is done by intruding two feedback loops. The flow “i” represents feedback internal from the firm, and flow “a” represents a feedback loop from the market. The feedback from the market may come from other firms, customers, suppliers or other news reports. Both (a) and (i) are a source of new and frequent information back to the central management team and continue to influence the central management attitudes on an ongoing basis.

One can assume for example that a positive response from the market via the feedback loop (a) (e.g a customer contacting the central management team to compliment the firm on a new product or service or positive press response from a new offering) would positively influence the attitude of central management about that offering (1.1), and hence could result in central management spending more time looking at the productive opportunity (1.3) and potentially allocating more firm general management time resources to the productive opportunity (2.0). Equally, negative feedback from the market via feedback loop (a) may negatively affect central management attitudes towards the productive opportunity, and result in them stopping the project and mandating managers to allocate no more time to it, thus ending the pursuit of the productive opportunity.

The flows of information represented by the letters (a), (d), (e) and (i) can also be considered as "signals" a term introduced in Penrose's (1959) TGF. Penrose points to how signals from inside the firm can influence how the market reacts. This idea of signals proposed by Penrose (1959) is expanded upon in the ATBV conceptual framework. The ATBV framework proposes that the firm's behaviour (both central management and individual managers) send information signals both to the market and to others within the firm. These signals can influence the behaviour of other employees in the firm and / or individuals external to the firm (the market).

The importance of signals can be illustrated using information flow (d) as an example, where information flows from the central management team to the general managers. In this, the central management can send explicit, implicit or even accidental signals to general managers and employees inside the firm. An explicit signal could be, for example, sending out a memo to employees informing them the firm has committed to working on a specific new productive opportunity. An implicit signal could be, for example, a member of the central management deciding to call or visit a general manager who is working on a new idea to discuss the idea in more detail. This may signal to the manager (and others who also witness the visit), that central management supports the new productive opportunity, and therefore it is important for the wider firm. An accidental signal can be sent when a central manager gives the impression of supporting a particular productive opportunity, without being cognizant that they are sending this signal. Using the same example as the implicit signal, the same member of the central management team could call or visit a manager who is working on a new productive opportunity, but for motives not connected to the new productive opportunity. Regardless of why the member of the central manager visited the general manager, this visit may give the signal to others in the firm that the central manager supports the productive opportunity the general manager is working on.

These explicit, implicit and accidental signals can also occur inside and outside of the firm. Examples of explicit external signals are press releases or published reports (such as an annual report) commissioned by the firm. These act as explicit signals within the firm and also to the external market that signal what the firm considers as important. Implicit signals could be, for example, when a firm promotes a particular issue or idea that it indirectly wants to associate itself with, without explicitly stating that the firm considers it as important. An accidental signal may occur when, for example, a central manager in the firm does an interview with trade journals, and accidentally reveals information that indicates the direction of the firm, or when a journalist

intentionally or unintentionally misinterprets information from the manager and release this information to the wider market. Understanding these different signals, and how they affect the behaviour of employees inside the firm and also individuals outside the firm is a key part of the ATBV conceptual framework.

In the paragraphs above, the ATBV conceptual framework has been explained in detail, including the pillars, the mechanisms and the interactions between the different mechanisms. It is proposed that the ATBV conceptual framework is dynamic and continues ad infinitum, with new productive opportunities being introduced, stopped, started or adjusted inside the firm, with each affecting the attitudes and behaviour of the central managers within the firm, and subsequently affecting the time allocation of all available management time. The framework proposes that the allocation of this management time into different mechanisms ultimately influences the behaviour of the firm and firm-level growth.

3.4 Concluding remarks on the development of the ATBV conceptual framework.

This chapter has sought to principally address the gaps identified in TGF (Penrose, 1959) and in doing so build the theoretical foundations to allow this research to investigate how management attitudes and the allocation of management time can influence the growth of the firm, as laid out in RQ2. This chapter has principally built on the theoretical foundations of TGF (Penrose, 1959), and complemented the theory with elements from the theory of planned behaviour (Ajzen, 1985, 1991) to build a new conceptual framework that can serve to provide a deeper understanding of the attitudes that govern the behaviour of the central managers of a firm and how their behaviour impacts the allocation of management time across the firm. The output of this chapter is the development of a new ATBV conceptual framework that can be used to address RQ2.

Thus, the next step in this research is the testing and application of the ATBV conceptual framework. Referring back to the ideas of Whetten (1989) and the criterion for theory that was developed at the start of this research, a theory (and therefore the ATBV conceptual framework that purports to add to theoretical development) should explain when, to whom and where the theory is applicable. In other words, the theory must be placed within a contextual setting. The next chapter aims to address this point and provide a contextual setting for the testing of the ATBV framework.

4 Specifying the contextual setting in which to test and apply the ATBV conceptual framework

4.1 Chapter introduction

The principal aim of this chapter is to define the contextual setting and contextual boundaries within which to test and apply the ATBV and address RQ2. According to TGF (Penrose, 1959), any firm can pursue any type of new productive opportunity. The only constraint to this, according to Penrose (1959), is a limitation on capacity (or time) and creativity on the part of the managers that run the firm, and then, a limitation of available management capacity (or time) to exploit the opportunities identified. It is proposed that the ATBV conceptual framework can be used to investigate why any firm may seek to pursue any new productive opportunity and identify how management time can constrain the firm from pursuing it. Such a generalisation is useful from a theoretical perspective, but as previously noted, the aim of this research is not to provide wide general theories (Makadok et al., 2018), but rather to more deeply understand the behaviour of firms.

In order to deeply investigate the behaviour of a firm, it is elected to specify certain contextual boundaries in which to test and apply the ATBV conceptual framework and answer RQ2. Specifically, it is elected in this research to explore the management attitudes and management time allocation in a firm that is considering whether to diversify away from its core offering to pursue a new productive opportunity in order to grow. This context is selected as such a change implies a significant change of direction and behaviour of the firm. In order to investigate this, it is necessary to specify the contextual boundaries for RQ2 from three perspectives:

a) Specifying the type of change the firm is undertaking
b) Specifying the type of new productive opportunity that the firm is considering pursuing
c) Specifying the type of firm that is seeking to pursue the new productive opportunity

It is proposed that by specifying these elements at the outset, this allows a specific application and testing of the ATBV conceptual framework.

This chapter is organised around these three contextual boundaries, with one section dedicated to each. The first section considers different types of change that a firm may undertake, and after considering four different types of change, elects to focus on a planned strategic change (Leseure et al., 2010). The section contains an overview of each of the different types of change considered and provides the rationale for selecting a planned strategic change for this research.

The next section focuses on one particular type of productive opportunity that a firm could pursue through a planned strategic change. The new productive opportunity selected is that of a PSS (Product-Service Systems), a term coined by Geodkoop et al., (1999) to refer to a new productive opportunity that brings together a tangible product and an intangible service into one combined commercial offering. Within this section, a definition of PSS and its components are provided as well as a brief sub-section explaining the four key reasons for selecting PSS as the productive opportunity investigated in this research.

It is on investigating PSS business models, that this research identified a particular lack of research into the notion of service firms developing PSS business models using a productization strategy (Harkonen et al., 2015). In fact, there has been limited investigation into understanding productization as a strategy (Harkonen et al., 2015; Leoni, 2015), specific case learning of how firms develop productization strategies is not well documented (Chattopadhyay, 2012), and most literature related to productization is found among business practitioners in managerial magazines but is not discussed explicitly in the academic literature (Harkonen et al., 2015). The lack of research as to why service firms may pursue a productization strategy and move away from its core service offering to pursue a PSS as a new productive opportunity is therefore identified as a novel contextual field in which to test the ATBV framework.

Although novel and interesting, the idea of using the ATBV conceptual framework to investigate how service firms could develop a PSS productization strategy is considered too broad for this research, due to the wide range of service firms that exist. To overcome this, the third and final section of this chapter specifies a certain type of service firm, a so-called Logistics Service Provider (LSP) as a contextual boundary for RQ2. Thus, the final section of this chapter provides an introduction to the term logistics and logistics service provider, as well as a brief overview of why pursuing a PSS business model is currently highly relevant for LSPs.

4.2 Types of strategic change available to firms

One could argue that firms are continually looking for and deciding whether to pursue new productive opportunities that may or may not be a diversification from their core offering. In theory, the ATBV conceptual framework could be used to investigate any of these decisions. However, to fully test the ATBV conceptual framework, it is elected to seek a firm-level decision that results in a major strategic change of direction for the firm away from its core offering. It is proposed that investigating such a major strategic change will permit a deeper examination of the mechanisms included in the ATBV conceptual framework and allow the mechanisms to be tested more rigorously.

As such, it is elected in this research to test the ATBV conceptual framework in the context of a firm making a major strategic change from its core offering in the pursuit of a new productive opportunity. As noted in earlier sections, although TGF (Penrose, 1959) has made major contributions to the field of strategy, Penrose (1959) did not make explicit use of the term “strategy” or “strategic change”. Consequently, it is necessary to look beyond Penrose (1959) for literature related to strategic change. Leseure et al., (2010) argue that there are four types of strategic change:

- A planned change, where the firm reviews where it is now, and where it wants to be, and then sets out a plan to get there. (Greenwood and Hinings, 1993).
- A reactive change, where firms are forced to change, usually caused by an abrupt external change (Mellon, 1993).
- An emergent change, where firms use incremental changes and adapt flexibly over time (Isenberg, 1987; Mintzberg and Waters, 1985).
- A spontaneous change, where firms attempt to make a “whole system change”, which is continuous, unpredictable and uncontrolled (Eisenhardt and Brown, 1998).

In fact, these four types of strategic change can be broadly classified on two separate axes of “why” the firm elects to change, and “how” it realizes the changes. Such a classification is visualized in Figure 8.

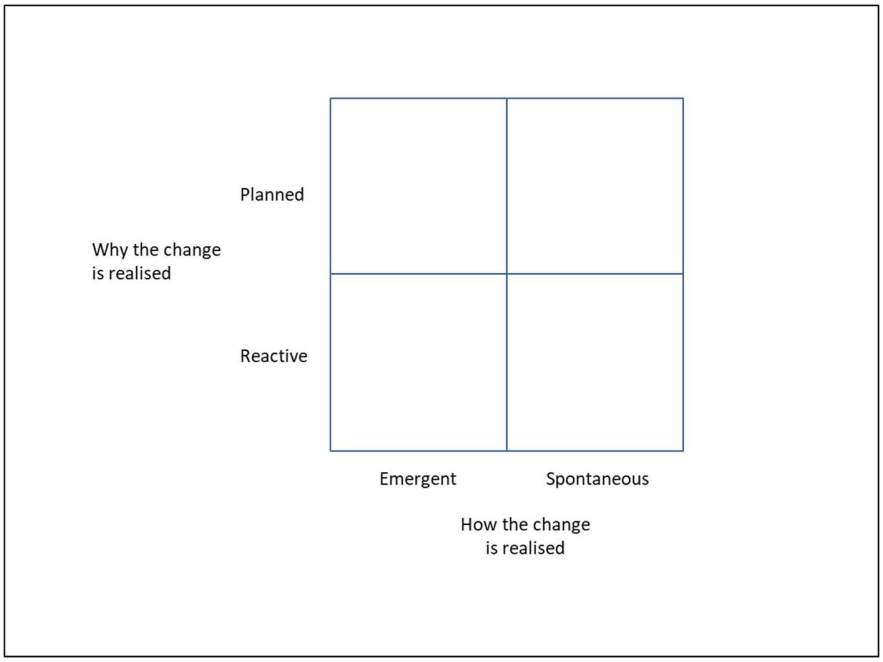


Figure 8 : Classification of different types of strategic change (author's own interpretation)

On one hand, it can be argued that a planned change and a reactive change relate more to "why" the firm elects to change, with a reactive change implying that the firm is forced to change due to some factor outside of its control, whereas a planned change implies that the firm deliberately and proactively elects to make a change. On the other hand, an emergent change and a spontaneous change are more related to "how" the firm makes a change, with an emergent change implying that a change is made gradually over time, whereas a spontaneous change implies a more radical, big-bang type change to the firm's strategic direction. Although the two axes are not completely mutually exclusive, and in particular, a planned strategic change (as defined by Greenwood and Hinings, 1993) could relate to both the why and the how, the classification of the different types of strategic change allow a more detailed consideration of whether the focus of the firm-level investigation is on the "why" or the "how" of the strategic change, or both.

For the investigation in this research, related to a strategic move away from a core offering to pursue a new productive opportunity, it would be possible for a firm to use any of these four

strategic change types identified by Leseure et al., (2010). However, the focus for this research is on the first type of strategic change; a planned strategic change.

The reason for this is that this research seeks to principally understand why a firm would actively elect to diversify away from its core offering as a deliberate choice, in other words, where the firm makes a choice to do so. As such, logically, a reactive change is less relevant as it implies that the firm does not elect to change, but rather it is forced to do so. Similarly, as this research aims to understand how management attitudes influence how firms decide to spend management time on either the existing business or pursuing new productive opportunities, this research is less focused on the method of change, whether it be emergent or spontaneous, and more focused on why firms decide to make the change.

Consequently, this research specifies the type of change to be investigated in RQ2 as a planned strategic change. It is within the contextual boundary of this type of change that this research seeks to test and apply the ATBV conceptual framework as a means to improve understanding of how management attitudes and time allocation influence an LSP firm to make a planned strategic change away from its core logistics offering to the pursuit of PSS as a new productive opportunity. In the next section, the productive opportunity used as the contextual setting for RQ2, that of PSS, is introduced.

4.3 A brief introduction to PSS business models

The term PSS (Product-Service Systems) was coined by Geodkoop et al., (1999) to refer to a new business model that combines a tangible product and an intangible service into one single commercial offering. Geodkoop et al., (1999) proposed that these new PSS business models could prove to be commercially attractive for firms, more environmentally sustainable for the planet and at the same time, fully meet customer functional requirements.

Since the first formal definition of PSS by Goedkoop et al., (1999), several researchers (Baines et al., 2007; Brandstotter et al., 2003; Manzini and Vezzoli, 2003; Mont, 2002; Tukker and Tischner, 2006, Li et al., 2020) amongst others, have added considerably to the body of knowledge related to PSS. Although much of the initial PSS research was focused on the sustainability benefits of PSS (Mont, 2002), more contemporary PSS research focuses on the commercial opportunities available from PSS business models (Annarelli et al., 2020) and in particular the commercial opportunities available from combining a tangible product with

intangible digital data related services (Sakao, 2020). As such, research into PSS continues to develop and evolve today.

Perhaps due to PSS's evolving nature, further to Goedkoop's initial PSS definition (Goedkoop, 1999), subsequent authors have also proposed their own definitions of PSS (Brandstotter et al., 2003; Manzini and Vezzoli, 2003; Mont, 2002). For a more detailed summary of the historical developments of the definitions of PSS, see Baines et al., (2007).

It is not the intention of this research to argue for one definition over another. Instead, this research recognises that different definitions of PSS continue to evolve as the topic advances and develops. However, it is considered important for this research to avoid any ambiguity and to specify the definition of PSS that is adhered to in this research. Thus, the definition of PSS applied in this research is:

"A commercially attractive, pre-designed system of tangible products and intangible services that aims to have a smaller environmental impact than separate product and services, but provide the same or better functional fulfilment for the customer".

This definition is selected as it incorporates the four key dimensions of a PSS, namely: A system of tangible products and intangible services, commercial attractiveness for firms, reduced environmental impact and the meeting of customer functional requirements.

By definition, PSS is a made up of three separate components: a Product, Service and System. These three components are defined separately by Goedkoop et al., (1999) as:

Product: A tangible commodity manufactured to be sold. It is capable of "falling on your toes" and of fulfilling a user's needs.

Service: An activity (work) done for others with an economic value and often done on a commercial basis

System: A collection of elements including their relations

Although the definitions of the three components provided by Goedkoop et al., (1999) are widely used and accepted, it is found that some ambiguity about the definition of each component

remains. For this reason, the following section provides additional details on the definitions of each component used in this research.

Tukker (2004) suggests to distinguish a product from a service in the following way: anything tangible in the offering is the product element, and anything intangible is the service element (Tukker, 2004). This definition is also used by Baines et al., (2009), who notes that the “product” is generally understood by manufacturers as a tangible commodity represented by a material artefact and everything else is a service (Baines et al., 2009).

However, confusion can arise as the term product is used by other academics to refer to intangible elements. For example, Sawhney (2016) argues that a product is created when some aspect of a service is automated, infused with analytics, and monetized differently. Equally, Brännström et al., (2001) indicate that a product is not limited to a physical artefact, but that it is anything that consists of any combination of hardware, software and services being sold for the purpose of supplying a function.

As well as academics, practitioners also contribute to the ambiguity of the term “product” and are frequently found to use the term product to refer to a package of intangible services. For example, Microsoft, one of the largest software companies in the world, promotes on its website (Microsoft, 2018) that it offers online spreadsheets as a “product”. In fact, using the definition provided by Goedkoop et al., (1999) that a product is something that can fall on your foot, this so-called “product” offered by Microsoft should be classified as a “service”.

To avoid such ambiguity, in this research, the definition of a “product” provided by Goedkoop et al., (1999) is used, which defines a product as a “tangible item that can fall on your foot”.

The term “service” is as equally problematic as the term “product”. Service can refer to a service offering such as maintenance, repair or insurance. However, as pointed out by Baines et al., (2009), service can also refer to a performance level, in the sense that an organisation provides a good service level for example. Again, to avoid ambiguity in this research, the original definition of “service” provided by Goedkoop et al., (1999) is applied in this research, in that service relates to an activity done for others with an economic value and done on a commercial basis.

With the terms Product and Service considered, the last element “System” can be reviewed. The definition by Goedkoop et al., (1999) does not fully capture the importance of the interconnectivity of the different components, and thus other definitions were considered. Evans et al., (2007, pg 4227) describe a system as

“a collective entity that aims to achieve an objective, consisting of an arrangement of material and immaterial elements (components, parts, and subsystems), where the elements are interrelated, interdependent or interacting”

It is proposed that this definition better captures and describes a “system” than that used by Goedkoop et al., (1999). Thus, this definition of a system is used in this research.

With this, the different components of PSS have been reviewed and it is now possible to provide the definitions of the components of PSS used in this research

Product: A tangible item capable of “falling on your foot”

Service: An intangible activity done for others with an economic value

System: A collective entity that aims to achieve an objective, consisting of an arrangement of material and immaterial elements (products, services, software and subsystems), where the elements are interrelated, interdependent or interacting

With PSS and its components introduced, it is now possible to layout the rationale for selecting PSS as the contextual productive opportunity to be used in RQ2.

4.3.1 Rationale for selecting PSS productization as the contextual field to test the ATBV framework

The rationale for selecting PSS productization as the contextual field to test the ATBV framework is driven by four separate but related factors. Firstly, PSS remains highly relevant today due to the continued importance and demand for firms to adopt environmentally sustainable business models (Albino et al., 2009; Beuren et al., 2013; Cook et al., 2006; Hinton, 2008; Mont, 2000; Oliveira et al., 2015). Secondly, pursuing a PSS as a new productive opportunity is considered a major strategic change for firms (Leseure et al., 2010) as it requires a significant firm-level change to move from an existing business model to a new PSS business models (Cook et al., 2006;

Hinton, 2008; Mont, 2000; Oliva and Kallenberg, 2003). Thirdly, although there is growing academic research and interest into the possibility of firms adopting new PSS business models, most existing research into PSS suffers from a lack of research based on strong theoretical foundations (Tukker and Tischner, 2006) and relatively little attention has been dedicated to advancing the theoretical underpinnings required for robust PSS research (Li et al., 2020). As the ATBV conceptual framework developed in this research is based on the theoretical foundations of the theory of the growth of the firm (Penrose, 1959), this research can assist PSS researchers with future theory development. Fourthly and lastly, although there is a growing body of PSS research (Oliveira et al., 2015), there is a lack of research to date on the opportunity for service firms in particular to adopt PSS business models by means of a productization strategy (Leoni, 2015). This latter point is particularly relevant for this research and forms the basis for a separate paper written and published as part of this research and provided in the annexe (see appendix for published paper).

The previous section has provided an overview of PSS as a business model that service firms can pursue as a new productive opportunity and specified the second contextual boundary for the application of the ATBV conceptual framework. The following section sets the third and final contextual boundary and considers a particular type of service firm, that of a logistics service firm, that may elect to pursue a PSS business model. The section provides a brief definition of the term logistics and provides an overview of existing research into the potential for logistics services firms to adopt PSS business models.

4.4 The potential for logistics service providers to develop PSS business models

The term “logistics” originated in the military, and initially referred to “the science of the movement, supplying and maintenance of military forces in the field” (www.dictionary.com, 2017). Since then, the term logistics has become well established in industry. Despite its widespread use however, there remains debate, both within academia and amongst practitioners on one unified definition of logistics. The dictionary definition of logistics in an industrial context is “the management of materials flow through an organisation, from raw materials through to finished goods (www.dictionary.com, 2017). However, Mentzer et al., (2001, pg 16) provide two alternative definitions, including

“Logistics is the process of planning, implementing and controlling the efficient flow and storage of raw materials, in-process inventory, finished goods, services, and related information from point of origin to point of consumption (including inbound, outbound, internal and external movements) for the purpose of conforming to customer requirements”

and

"Logistics is that part of the supply chain process that plans, implements, and controls the efficient flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers’ requirements”.

Although it is not the intention here to add further definitions, one can conclude from the above definitions that logistics is related to the movement of goods from the extraction of raw materials to end of life of the product. One thing that is not mentioned in the definitions of logistics, is that the term includes the manufacturing of products. Thus, it can be safely argued that manufacturing and logistics are, at least from a definition perspective, mutually exclusive. Thus, any logistics firm that aims to manufacture products, can be said to be pursuing a productization strategy (in the sense of adding a tangible offering to the existing intangible logistics service offering).

It is also worth noting here the discussions on the distinctions between “logistics” and “supply chain”, a discussion worthy of full papers from (Cooper et al., 1997; Lummus et al., 2001), but a discussion which it has been elected not to enter into in this research. Thus, the focus of this research is on logistics, and deliberately excludes the wider topic of “supply chains”.

Firms have moved products for centuries, thus firms carrying out logistics activities is nothing new. What is new, however, is the provision of logistics services as a separate industry, something that only developed the late 1980s (Sheffi, 1990). Since then, the logistics service industry as a whole has experienced tremendous growth, exemplified by the growth of large Logistics Service Providers (LSPs) such as DHL and UPS (see annexe of this research for financial data relating to the growth of large LSPs).

LSPs have grown through a mixture of geographical expansion, organic growth, merger, acquisition and alliance (Wong and Karia, 2010), and service extension. It is interesting to note, however, that despite this myriad of ways that LSPs have grown, no research is found that

suggests that logistics firms have expanded into manufacturing services or PSS development. In fact, some research exists which suggests that LSPs have been poor at innovating and developing new business models (Busse and Wallenburg, 2011).

The review of the literature on large LSP firms maintains a consistent and clear division between logistics and manufacturing. As illustrated in the research by Cheong (2004), logistics sits between manufacturers and retailers, and the idea is not even raised that the LSP could move back down the supply chain into manufacturing via a productization strategy. The only evidence found of research pointing to the potential of LSP firms to add manufacturing capability to their logistics service offering is that of Holmström and Partanen (2014), who argue that LSP firms are best positioned to build the infrastructure for digital (additive) manufacturing.

The work of Holmström and Partanen (2014) serves to illustrate that the idea of an LSP manufacturing products is a novel idea, as the authors argue that LSPs starting to manufacture products will result in LSPs taking on a whole new role in the value stream.

As well as limited research into the idea of LSPs moving into manufacturing, no evidence was found in the literature which looked specifically at the adoption of PSS by a logistics service provider. However, the provision of logistics services within a PSS is noted by both Pal (2016) and Szwejczewski et al., (2015) who point to the importance of logistics services within a PSS. In particular, Szwejczewski et al., (2015) highlight the importance of reverse logistics and the taking back and recovering products after use to reduce waste disposals, a point also raised by Kuo et al., (2010). Zhang et al., (2016) demonstrate the potential for logistics companies to play a part in the development of PSS business models, but the authors limit the idea to LSPs supporting manufacturers to develop PSS business models, rather than the LSPs developing their own PSS business model.

Beyond the reference to reverse logistics in the development of PSS (Pal, 2016; Szwejczewski et al., 2015), logistics within a PSS context does not feature heavily and the function of logistics is more considered as a supporting role for a manufacturers' PSS, rather than the logistics provider creating and leading the PSS solution.

Thus, to date, there is limited research into the possibility of logistics firms adding manufacturing capability or pursuing a productization strategy to develop a PSS offering, despite the opportunity

identified by Holmström and Partanen (2014) that LSPs are well placed to do so. The idea that LSPs are well placed to start manufacturing is founded on the idea that technological advances such as additive manufacturing, also known as 3D printing (Holmström and Partanen, 2014; Kandampully, 2002) are key enablers for LSPs to develop PSS business models. 3D printing potentially allows anyone to make anything at the click of a button without reliance on volumes and scale (Anderson, 2012). For LSPs, the development of 3DP technology is particularly relevant, as the technology could reduce the technical barriers for any company to begin manufacturing products (Holmström and Partanen, 2014). As such, the adoption of 3DP potentially opens up the possibility for more LSPs to add production capabilities to their service offering to develop a PSS (Anderson, 2012).

Despite this, the literature does suggest that today LSPs operate outside the boundaries of manufacturing and do not regularly pursue productization strategies. Thus, to understand if and how LSPs could overcome these boundaries and adopt a productization strategy to create a PSS, either using 3DP or not, one must further define the boundaries of logistics “services” and manufacturing “production”. This is required to be able to explore how the combination of these services and production can be amalgamated to create a PSS.

To begin exploring the boundaries of logistics services and production and their possible amalgamation to create a PSS, a framework provided by Gosling et al. (2017) to show decoupling points in the manufacturing process is adapted and combined with Tukker’s (2004) PSS typology framework. This framework is provided in Figure 9.

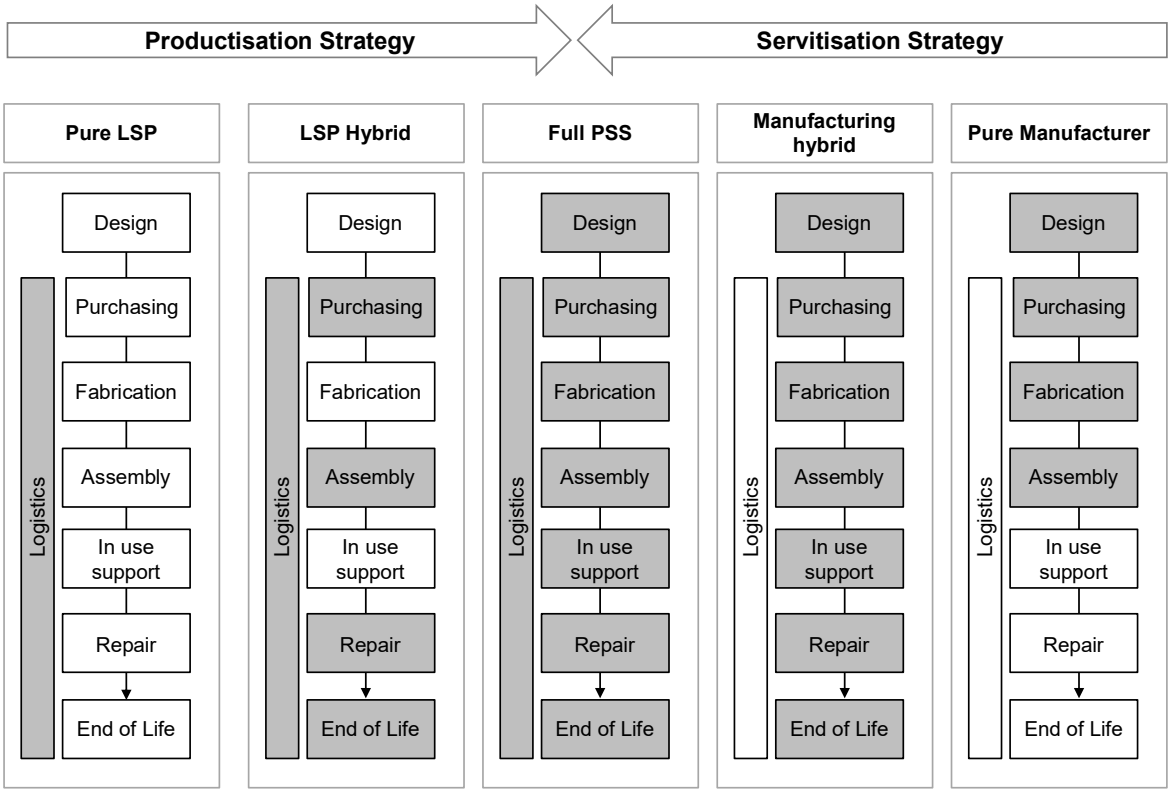


Figure 9 : From pure LSP to full PSS provider (adapted from a framework provided by Gosling et al., 2017 and Tukker, 2004)

The framework in Figure 9 shows that a pure LSP, on the left of the framework, would limit itself only to the provision of logistics services (highlighted in grey), and would not get involved in any manufacturing or engineering related steps (such as design, fabrication or assembly for example). At the other extreme, on the right-hand side of the framework, a pure manufacturer would only design, purchase, fabricate and assemble parts, and would not get involved in any service elements (such as logistics service, in use support, repair or end of life services). At the centre of the framework is a full PSS provider, which would perform all associated production and service offerings throughout the product life cycle. To complete the framework, an LSP hybrid or Manufacturing hybrid is represented as a firm who is involved in some elements of the production and some elements of the service offering but does not own the entire PSS solution.

Such a framework is provided to demonstrate the steps that can be taken by an LSP to move from their core service offering of providing logistics services (far left) to the development of a PSS (centre) as a new productive opportunity using a productization strategy. What remains to

be investigated however is whether the newly developed ATBV framework can help to shed light into why the managers of an LSP firm would seek to move their firm away from this core offering of providing logistics services, to the pursuit of a PSS as a new productive opportunity and whether the ATBV conceptual framework can be used to investigate and explain the planned strategic change. Before exploring this question further, the next section summarises and concludes the key ideas from this chapter.

4.5 Concluding remarks

The chapter has specified the three contextual boundaries in which the ATBV conceptual framework will be applied and tested. First, the chapter has specified that the conceptual framework will be applied in the context of a planned strategic change. Second, the chapter has specified that the ATBV conceptual framework will be applied in the context of a specific type of new productive opportunity that a firm may elect to change towards, namely a PSS business model. Third, this chapter has specified that the ATBV conceptual framework will be applied in the context of a specific type of firm, that of an LSP service firm.

With the contextual boundaries now investigated and defined in this chapter, this research can now move on to developing a research methodology to test and apply the ATBV conceptual framework within these contextual boundaries and address RQ2. The research methodology developed to test and apply the ATBV conceptual framework within the contextual boundaries defined is presented in the next chapter.

5 Research methodology

"The word methodology comprises two nouns: method and ology, which means a branch of knowledge; hence, methodology is a branch of knowledge that deals with the general principles or axioms of the generation of new knowledge. It refers to the rationale and the philosophical assumptions that underlie any natural, social or human science study, whether articulated or not. Simply put, methodology refers to how each of logic, reality, values and what counts as knowledge inform research." (McGregor and Murnane, 2010, pg 2)

5.1 Chapter introduction

One advantage of research questions that seek to investigate firms, such as those laid out in this research, is the breadth of methodologies available to carry out those investigations. With such a breadth of possibilities available, it is therefore imperative to explain the rationale for the research methodology selected to address the research questions set out. It is to this imperative that this chapter pertains. Specifically, the purpose of this chapter is to explain the rationale for, and then the details thereof the research methodology applied to address the research questions set out in this research.

As indicated by McGregor and Murnane (2010) the research methodology goes beyond the technical procedures used to collect data; it also includes deep introspection from the researcher on their underlying research philosophy and their understanding of the world. In line with the ideas of Gill and Johnson (2010), it is agreed that there is no "best" research methodology. Consequently, the aim of this chapter is not to argue for one methodology over another, instead, the aim of this chapter is to explain the rationale and logic for the research methodology selected for this research.

The chapter is broadly divided into two parts, with the first part laying out the research methodology, and the second part assessing the research methodology selected both from a quality and ethical perspective.

The overall research methodology used in this research contains four key components (Bryman and Bell, 2011; Creswell, 2009; Saunders et al., 2012) which are used to structure the first part of this chapter:

a) research philosophy,
b) approach to theory
c) research strategy
d) data collection and analysis methods.

It is noted however that these four components are highly interrelated, with the research philosophy influencing and informing the selection of the research strategy. The research strategy being highly influenced by the approach to theory, and the approach to theory influencing the data collection and analysis techniques used. The binding factor and common thread to each of the four components are the research questions set out at the beginning of this research.

The first part of this chapter lays out the details of the research methodology, with one section dedicated to each of the four components of the research methodology highlighted above. The first section introduces the research philosophy that underpins this research. The second section is dedicated to the approach to theory considered in the research methodology. The third section considers different research strategies, then selects the most appropriate strategy for this research. The forth section lays out details of the data collection method used in this research, with a sub-section dedicated to providing the details of the three main means of data collection used; observational data collection, interview-based data collection and secondary data collection. For the observational and interview-based data collection, a specific sub-section is dedicated to explaining the sampling method applied to collect data. For the observational based data collection, a sub-section is also provided to introduce and explain a DISC (Direction, Importance, Strength, Consistency) analysis, a method developed in this research and used within the ATBV framework to collect observed data about central management attitudes.

With this, the four key components of the research methodology; the research philosophy, the approach to theory, the research strategy and the data collection techniques are provided. The chapter then moves into the second part, where the research methodology selected is assessed and critiqued. To assess the research methodology a section is dedicated to defining the criteria used to assess the quality of the research methodology. Next, a section then assesses the

research methodology developed in light of the quality criteria defined. The section also provides the mitigations considered for any identified and potential research quality issues. Next, a section is dedicated to considering any ethical issued identified in the research methodology. The final section summarises the limitations identified in the research methodology selected and the mitigations applied to reduce the impact of all known limitations.

5.2 Research philosophy

Silverman (2006) argues that researchers can put too much emphasis presenting and defending their research philosophy and that an understanding of philosophical terms is not required to carry out good research. This research rejects this view. Instead, considering the wide range of different philosophical lenses which could be used to investigate firms and the impact the lens selected can have on the conclusions drawn, this research adheres to the view of Moses and Knutsen (2007), who argue that the research philosophy is a key element of the research methodology.

Researchers have sought to investigate firms from many different philosophical perspectives (Chang et al., 2017), with some considering firms as a rational economic unit that can be investigated through mathematical models (Geroski, 2012), and others considering firms as a complex social entity with multiple non-rational dimensions which cannot be fully explained through mathematics (Selznick, 1948).

When selecting the most appropriate research philosophy to address the research questions set out in this research, as recommended by Burrell and Morgan (1979), different research philosophies were considered. Debates about the suitability of different research philosophies (or research paradigms, as they are also known) stretches back to early thinkers such as Comte (1853) and the debate about the appropriateness of different research paradigms remains divisive to this day (Cunliffe, 2010; Grant, 1996; Mingers, 2000).

It is not the intention here to add further fuel to the fires of the “paradigm wars” of the 1980s (Denzin and Lincoln, 2011). Instead, this research proposes that the different paradigms can best be expressed by the two extreme positions. On one hand, the positivist paradigm holds the view that objective, empirical research is the only true scientific method (Popper, 1972). On the other hand, the constructivist paradigm (Habermas, 1978; Schutz, 1967) argues that value-free,

objective research is impossible and that reality is a social construction, with multiple versions of the truth that researchers can aim to understand, but never objectively measure.

Use of the positivist paradigm to address the research questions set out in this research would lead to analysis focused on the quantified objective, economic performance of the firm, whereas a constructivist view would argue that firms and the markets in which they operate are multi-faceted social constructs which can only be fully understood through subjective, social research (Daft, 2008). Neither of these extreme positions was considered appropriate to address the research questions set out in this research. The principal reason for this is that any investigation into firm-level behaviour poses two key challenges (Moore, 1992); first, how does one identify the salient forces that determine firm-level behaviour, and second how does one measure the level of influence and impact of those forces on the behaviour of the firm? It is argued that a pure positivist perspective would ignore the breadth and complexity of the former challenge, and a pure constructivist perspective would ignore the established and common constructs that exist across multiple firms.

From within the two extremes of the positivist and the constructivist paradigm, in a series of papers throughout the 1970s, Bhaskar developed a new paradigm which has subsequently become known as critical realism (Bhaskar, 1989). In this, Bhaskar's starting point was to specifically argue against positivism and the notion that scientific research is only limited to looking at observable events. Instead, Bhaskar (1989) argued that scientific research is about exploring and understanding objects, entities and structures that exist even though they are perhaps not observable. But, Bhaskar (1989) also recognised that these unobservable elements do generate events that can be observed (Mingers, 2000).

Critical realism introduces a more nuanced view of reality (Zachariadis et al., 2013) that is distinct from either the positivist or constructivist view. Critical realism is a relatively new ideology, but one that has been widely applied in a range of disciplines, including economics, sociology, ecology, environmental studies, organisational theory (Mingers, 2000) and management (Easton, 2010). Even so, there remain different views on what critical realism actually is (Easton, 2010). Hunt (2003) recognises Sayer as the key figure in the development of the critical realism movement and Sayer's (2010) eight key assumptions underlying critical realism are used as the basis for the understanding of critical realism in this research (for details see Sayer, 2010: pg 5).

Sayer (2010) demonstrates that critical realism is distinct from both positivism and constructivism (Fletcher, 2017), in that critical realism recognises that events and objects do exist that can be observed and objectively researched. However, critical realism also recognises that research is subjective, open to different interpretations and that knowledge creation is ultimately a socially dependent practice.

Bhaskar (2013) and Fletcher (2017) argue that a critical realist perspective proposes that reality can be stratified into three levels: empirical, actual and real. As visualised in Figure 10, Zachariadis et al. (2013) develop these three levels into a conceptual framework and expand on the three levels by adding entities to the framework and visualizing how the different entities interact.

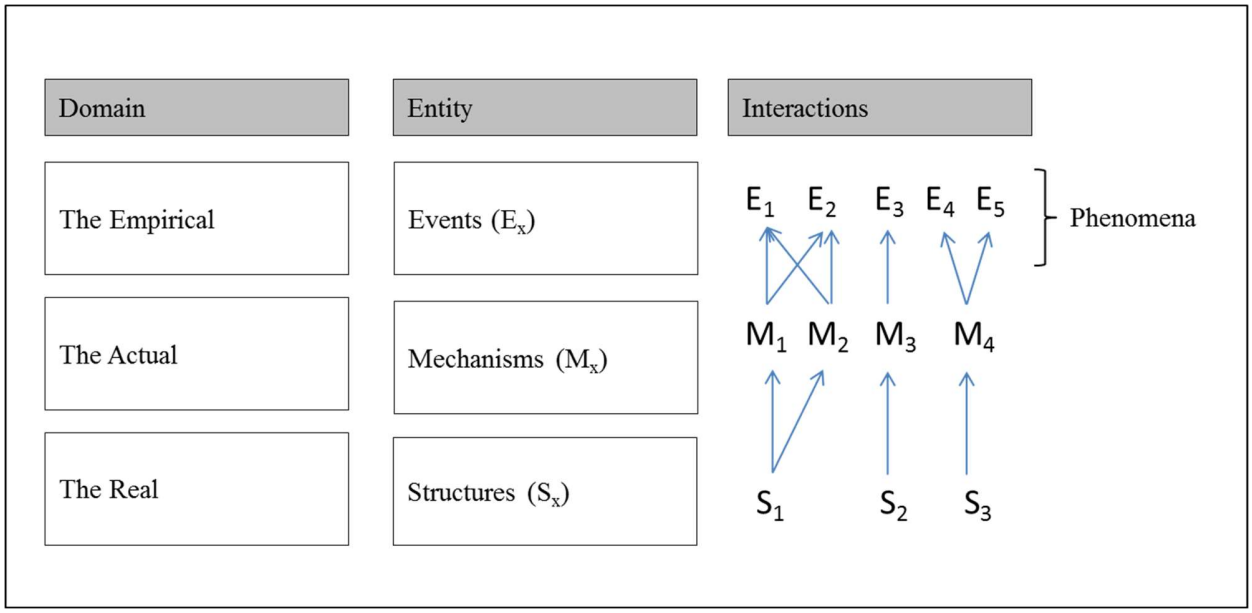


Figure 10 : Stratified framework of critical realism (adapted from Zachariadas et al., 2013 and Sayer, 1992)

The terms phenomena, events, mechanisms and structure used in the framework require further explanation as they are relevant for the research questions set out. Easton (2010) argues that the first task in any research project is to decide the phenomenon to be studied. Easton (2010) proposes that a firm, which is an entity that is clearly bounded but inherently complex, is an example of a phenomenon. Events occur within the scope of the phenomenon (the firm) and are

defined as activities that are recorded live or exist in records of the past including the memories of human actors who can attest to the events (Easton, 2010). Within the context of this research, an example of an event could be a workshop or meeting attended by managers of the firm. All managers will be sure the meeting took place, but each may have a different recollection of what occurred.

In contrast to the events, the structures are to some extent enduring. They have the power, not to determine, but to motivate or discourage, to enable or constrain action (Volkoff and Strong, 2013). Examples of structures within the firm include social structures between individuals, natural objects, material artefacts, and conceptual entities such as language, opinion and goals (Fleetwood, 2005). For this research, an example of a structure is the administrative hierarchy within the firm. This administrative hierarchy, an enduring structure that is similar across multiple firms, may influence the actors within the structure to behave in different ways.

The term mechanism which sits between structures and events is perhaps the most difficult to define; a review of the literature on the term mechanisms as applied to the social sciences provides nine different definitions for the term (Volkoff and Strong, 2013). In this research, the term mechanism is defined as an unobservable (Bunge, 2004) contextual relationship with a capacity for behaviour (Bygstad, 2010). With the term contextual indicating that the mechanism may produce an event in one context, and another event in a different context (Bygstad and Munkvold, 2011). For this research, this recognition of a contextual based mechanism is key as it indicates that certain structures, depending on their context, may be triggered or not, and may power or constrain an event (Volkoff and Strong, 2013). To illustrate this, Volkoff and Strong (2013) provide the example of the mechanism that mediates between a person and a fallen log. Someone walking along the path may consider the log as a barricade that constrains access, whereas someone wishing to prevent passage along the same path would consider the log as an enabler of the preventative event. A similar analogy can be applied to the theme in this research; PSS for a particular manager in a certain firm may be considered as an opportunity to grow the firm, but for another manager in a different firm, PSS may be seen as a threat and barrier to growth.

With the definitions of the stratified critical realism framework provided, it is possible to use the definitions to provide a deeper understanding of the ontological perspective of the critical realist philosophy. One of the most important tenets of critical realism is that reality is stratified, and also

that reality is not reducible to epistemology (our knowledge of reality). In fact, critical realists argue that researchers can only aim to capture a small part of a deeper, vaster, changing reality (Fletcher, 2017; Rubin and Rubin, 2011) and that although a real world exists, our knowledge of it is socially constructed and fallible (Bygstad and Munkvold, 2011). Thus, unlike the positivist view that argues that reality can be contained and measured, critical reality adopts a view of reality as an open and complex system where other mechanisms and conditions also exist (Zachariadis et al., 2013) and where many things happen in parallel making it impossible to isolate particular elements under experimental conditions (Sayer, 2010). The ontological perspective inherent in critical realism can also be differentiated from the social constructivist views, with social constructivists arguing that reality cannot be discovered, as it does not exist prior to social invention and that reality is constructed through human activity (Kukla, 2000).

The section above has considered a positivist and constructivist research philosophy and concluded that neither is an appropriate research philosophy for the research questions set out in this research. Instead, this section has explained the rationale for selecting critical realism as the most appropriate research philosophy to address the research questions set out in this research and provided an explanation of the ontological, axiological and epistemological assumptions inherent in a critical realist philosophy.

However, critical realism is a philosophy and not a method (Miller and Tsang, 2011). Hence, it is necessary to build the bridge between the philosophical perspectives inherent in critical realism, and the practical research strategies to be applied in this research in order to answer the research questions set out. Before selecting the most appropriate research strategy, however, it is first required to explain the approach to theory taken in this research

5.3 Approach to theory

As this research is primarily focused on theoretical developments, the important role of theory within the research methodology is worthy of particular attention. As specified by Dubois and Gadde (2002), the main objective of any research is to confront theory with the empirical world, and it is in the research methodology that these two elements are brought together.

Lee and Lings (2008) propose that academic research is concerned with this specific interaction of reality and theory, as visualised in Figure 11. This research aims to apply this concept by bringing together theory, in the form of the ATBV conceptual framework, and reality, in the form of the CasComp under investigation.

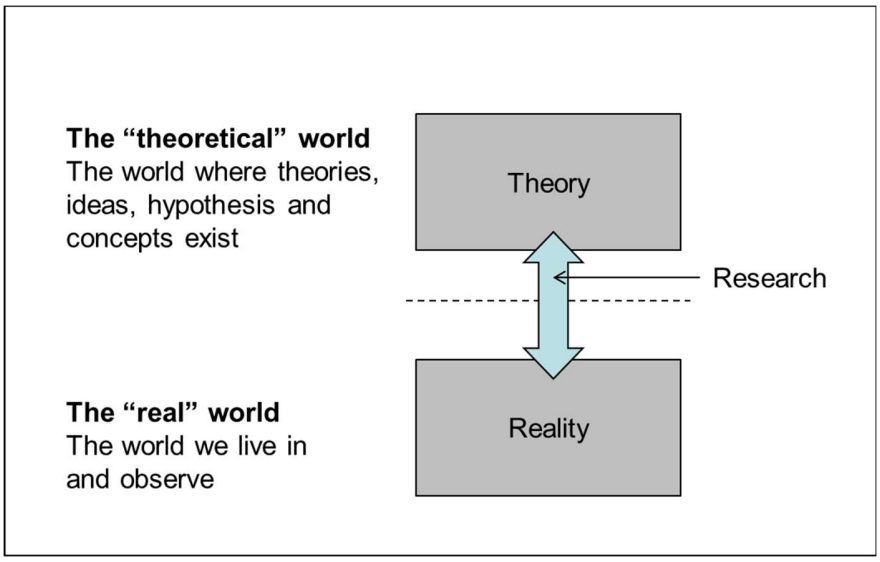


Figure 11 : Interaction of theory, reality and research (adapted from Lee and Lings, 2008)

Within the term theory, Lee and Lings (2008) make an important distinction between normative and positive theory, where positivist theory relates to a type of theory concerned with what is actually happening as opposed to what ought to happen, and normative theory is related to developing theory about the "right" way to do things, such as how to make the right ethical decision or the right way to make a business decision. In this research, the focus is on positivist theory as the research aims to understand how and why central managers within a firm actually make a decision, rather than on whether they made the right one.

Bringing theory and the empirical world together can be initiated from two contrasting perspectives. On one hand, a deductive approach involves selecting an existing theory and applying it in practice to validate, disprove or enhance the theory (Kovács and Spens, 2005). This approach tends to be used by more positivist minded researchers, and tends to lead to more empirical research strategies, where the researcher can use quantitative methods to test and validate theories. Conversely, an inductive approach involves moving from a collection of

observations to a general law, in other words, from facts to theory (Kovács and Spens, 2005). This approach has been widely used by social constructivist minded researchers and opens up the possibility to use research strategies such as grounded theory (Strauss and Corbin, 1994) where the researcher uses predominantly qualitative methods to develop and create new theory.

Although the deductive and the inductive approach can be portrayed as opposing ideas on a linear spectrum, the research methodology for this research draws on the ideas of Wallace (1971) and Crowe and Sheppard (2010) who provide an alternative view, whereby the two approaches (deductive and inductive) are actually part of one wider process and come together to create a wheel of science. The wheel of science is provided in Figure 12.

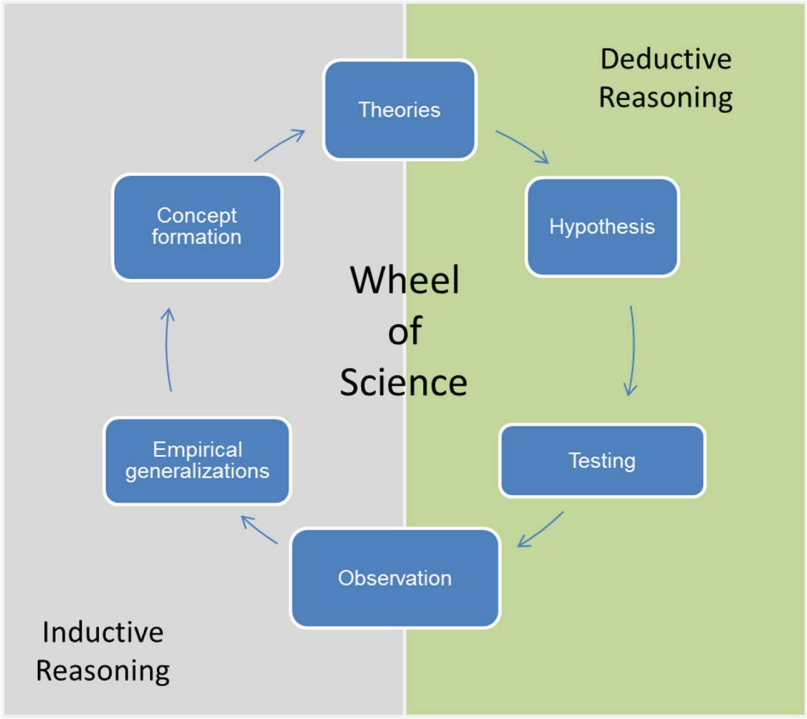


Figure 12 : Wheel of science (adapted from Wallace 1971, p18)

Bringing the two approaches of deductive and inductive together, rather than considering them as opposing extremes, opens up the possibility of combining ideas from both. In fact, it is argued that great advances in science did not emerge from either pure deduction or pure induction, but rather a combination of both (Kirkeby, 1990; Taylor et al., 2002, cited in van Hoek et al., 2005).

Using a combination of both inductive and deductive reasoning lies at the heart of abductive reasoning (Dubois and Gadde, 2002; Saunders et al., 2012).

With abductive reasoning, researchers aim to identify patterns and themes, which are then brought together into conceptual frameworks that can then be tested and further developed through data collection (Dubois and Gadde, 2002). It is important to note that an abductive approach is not considered as one single trip around the wheel of science, but rather multiple rotations around the wheel with a continuous confrontation of theory and data (Dubois and Gadde, 2002). So, where inductive research aims to generate theory, and deductive research aims to test it, abductive research aims to describe and understand reality in terms of social actors' motives and accounts, where theories are derived from concepts and interpretations of social life (Ong, 2012). This research then is not limited to either a purely inductive or a purely deductive approach. Instead, the approach to theory can best be defined as abductive, with the research travelling all the way around the wheel of science.

The steps used in this research to bring together reality and theory can now be explained using the wheel of science framework. However, as noted by Wallace (1971), researchers do not need to strictly adhere to the steps in the wheel in a linear fashion, starting at one stage and ending at another, but may often have to move from one step to another, and then return, in order to make progress around the wheel. In the case of research, this research began from an inductive approach, observing patterns and developments within the CasComp and reviewing a broad range of different theoretical perspectives before electing to draw on the theory of the growth of the firm (Penrose, 1959) as outlined in RQ1. Next, with the theoretical construction selected, this research developed the hypothesis that attitudes and time allocation played a role in influencing the overall behaviour of the firm and developed these constructs into a new ATBV conceptual framework. With the new ATBV conceptual framework created from existing theory, this research was then able to collect data and test the suitability of the ATBV conceptual and address RQ2.

With the research philosophy, research questions and approach to theory selected for this research, it is next possible to select the most appropriate research strategy to address the research questions set out. The selection of the research strategy used in this research is provided in the following section.

5.4 Research strategy

The research strategy is influenced by the approach to theory, but it can best be described as the bridge between the research philosophy and the detailed data collection method. To investigate firms, a number of different research strategies are possible, including experimental research, action research, grounded theory, case study, ethnography and archival research strategies (Bryman and Bell, 2011; Creswell, 2009; Saunders et al., 2012). Although these are often presented as separate strategies, the reality is that the labels are often applied to mean different things, and also the terms often tend to overlap (Hammersley and Atkinson, 2007).

When considering the strategy for this research, several inputs were considered. Firstly, the research philosophy. Secondly, the research question set out in this research and thirdly, the role of theory in addressing the research questions selected. Together, all three of these elements were considered when selecting the research strategy employed in this research.

5.4.1 Selecting the research strategy

In the same way that there is no single “best” research philosophy (Gill and Johnson, 2010), it is also argued that there is no one best research strategy to answer the research questions set out. Recognising that the selection of a particular research strategy will have a major influence on the data collection, analysis, results and conclusions, this research considered three alternative research strategies in detail to assess each strategy’s relevance and suitability to address the research questions set out. Namely, this research considered using action research, ethnography and case study research as alternative strategies to address the research questions set out.

Although the use of an action research strategy (Baskerville and Wood-Harper, 1996; Coughlan and Coghlan, 2002; Lewin, 1946, 1951; Susman and Evered, 1978) was considered in detail, the use of this strategy was rejected for this research due to a high risk of this research moving from an academic-focused piece of research towards a more practical, consultancy type research driven by the specific demands of the firm to be investigated. Similarly, the use of an ethnography strategy (Cunliffe, 2010; Hammersley and Atkinson, 2007; LeCompte and Schensul, 1999; Schwartzman, 1993; Watson, 2011; Zickar and Carter, 2010) was also considered in detail. The use of this strategy was rejected as ethnographical strategies are usually applied in inductive type research where theory is built up from observations and empirical discovery. As this research

drew heavily on existing theory, specifically, the theory of the growth of the firm (Penrose, 1959), the use of an ethnographical strategy was deemed inappropriate to address the research questions set out.

It was also considered whether to combine elements of action research, case study research and ethnographic research, an approach adopted by Tacchi et al., (2003). However, when attempting to combine elements from the three different research methods, it was found that fundamental differences exist between the three, rendering it difficult to combine elements of the strategies in any meaningful way. For example, even though case study research is often closely related to ethnographic research (Yin, 2003), major distinctions exist; an ethnographic research strategy would generally involve bringing together many observations to develop a theory, whereas case study research would generally take an existing theoretical underpinning and collect data through the lens of an existing theory. Thus, it is proposed that trying to combine ethnography and case study into one research strategy would cause confusion.

Thus, through a process of elimination, this research rejects the idea of using action research or ethnographic research or using a combination of ideas from each and instead opts to use a case study research strategy, details of which are provided in the following section.

5.4.2 An introduction to case study research

Although case study research has been applied for many years across multiple disciplines (Seuring, 2008; Voss et al., 2002; Yin, 2013) and some of the best-known studies in business and research are based on this design (Bryman and Bell, 2011), it is recognised that case study research is also one of the most criticized research methods (Ellram, 1996). Tight (2010) recognises that the term is regularly applied, but questions whether it is a method, a methodology, a strategy, a design, an approach, or something else.

Despite the criticisms of the case study method, authors such as Yin (2013) and Gray (2013) have argued that case study research is a research strategy and Yin (2013) in particular has laid out the foundations of how the strategy can be applied to carry out robust research. In terms of defining case study research, Yin (2009, pg. 13) proposes that case study research is “an empirical enquiry that investigates a contemporary phenomenon within its real-life context,

especially when the boundaries between the phenomenon and the context are not clearly evident". Two separate components of the definition indicate the appropriateness of using a case study strategy for this research. First, this research aims to investigate the phenomenon of firm-level behaviour within the real-life context of the development of PSS business models for LSP service firms. Second, the research questions set out in this research, as well as the ATBV conceptual framework developed to answer them, seek to understand the boundaries and level of interactivity between management attitudes, management time, firm behaviour, and firm growth.

Gray (2013) goes on to argue that a case study research strategy is particularly useful when the researcher is trying to uncover a relationship between a phenomenon and the context in which it is occurring. In this research, it is aimed to uncover the relationships between management attitudes and management time, firm-level strategy and firm-level growth. Furthermore, these relationships are investigated within the context of developing a PSS productization strategy in the logistics industry. This further supports the proposal to use a case study research methodology for this research.

Easton (2010) also highlights the benefits of using a case study method, arguing that it provides the opportunity to tease out and disentangle a complex set of factors and relationships. For the research questions in this research, which aim to tease out and increase understanding of the relationships between management attitudes, management time and firm-level growth, a case study method, therefore, seems particularly appropriate.

Furthermore, both Voss et al., (2002) and Eisenhardt (1989) point to the benefits of using case study research for developing, testing and refining theory. Eisenhardt (1989) in particular argues that case study research is particularly useful when it is based on the prior development of a theoretical position, which is the case in this research, where the theory of the growth of the firm (Penrose, 1959) and the theory of planned behaviour (Ajzen, 1991) provide the theoretical foundations for addressing the research questions set out.

Although many of the arguments proposed so far suggest that a case study strategy is useful for this research, one must also consider the arguments against. As pointed out by Yin (2009) case study research has not been universally accepted as being reliable, objective and legitimate and that it is often difficult (indeed dangerous) to generalise from one specific case. However, as

argued by Gummesson (2000), many new ideas and research, even in the most established research communities such as medicine, knowledge is built up from an understanding of many individual cases.

As for the criticisms of case study research not being reliable, objective and legitimate, it is argued that this criticism is not a critique that can be applied to the general approach of case study strategy, but is more applicable at the specific design applied by the researcher. As pointed out by Yin (2013) and Voss et al, (2002), critiques of case study research are particularly justified when insufficient attention is paid in the research design (Yin, 2013). Thus, for a case study research strategy to be used, the research design must be both robust and practical, and able to provide new insight into the phenomenon being researched.

To conclude and to avoid ambiguity on the research strategy used in this research, the strategy employed is henceforth defined as a case study research strategy. With this case study strategy selected, it is now possible to move on to discuss how the strategy will be applied to address the research questions set out. This topic of how the case study research strategy will be applied is laid out in the following section.

5.4.3 Different types of case study research

Case study research is a broad term and many different categories of case studies can be considered. Scapens (1990) refers to four types of case study research:

1) Descriptive: Research is focused on describing current practices
2) Illustrative: Research aims to illustrate new and possibly innovative practices adopted by respective organisations
3) Experimental: Research examines the difficulty of implementing new procedures and techniques and evaluating the impact
4) Explanatory: Research aims to utilise existing theory to understand and explain what is happening.

The term explanatory research is considered as the most appropriate description of this research and the research questions set out, as the research aims to test ideas from existing theories,

brought together into the ATBV conceptual framework, to explain the behaviour of a firm within the contextual boundaries of an LSP electing to pursue a PSS productization strategy. However, this research and the use of the ATBV conceptual framework aims to go beyond understanding and explaining what is happening in the firm and also seeks to understand why it is happening. As highlighted by Voss et al., (2002) the use of case study research is particularly useful for providing this deeper understanding as to why something is happening, as well as explaining what is happening.

In terms of the practical application of using a case study research strategy, important decisions need to be made in terms of the unit of analysis of the research, the time horizon in consideration and the role of theory in the design. These three different considerations are assessed in the following sub-sections, beginning with the question of the unit of analysis to be applied in this research.

5.4.4 Selecting the unit of analysis for this research

Selecting the unit of analysis for case study research can be designed around the two dimensions of number of firms to be included and the level of granularity considered within the firm(s) (Bryman and Bell, 2011; Saunders et al., 2012; Yin, 2013). These two dimensions are represented in Figure 13 with examples provided of research carried out positioned within the respective dimensions.

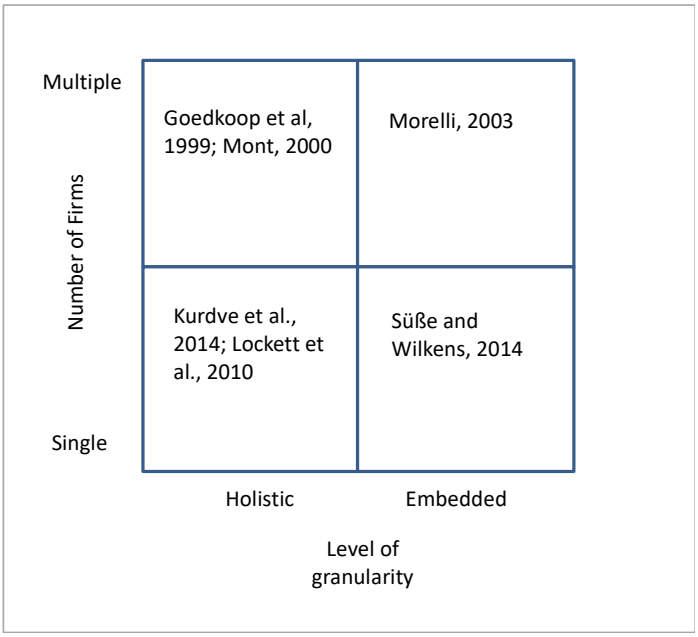


Figure 13 : Dimensions of case study research (adapted from Bryman and Bell, 2011)

Starting first on the vertical axis is the choice of whether to focus on a single firm or use multiple firms. Both options would be valid for this research. A multi-firm case study research involves multiple firms being researched and compared at a single point in time or across a period of time. The method can be useful to identify what is unique and what is common across cases, promoting theoretical development and providing a starting point to draw generalised conclusions (Bryman and Bell, 2011). Conversely, a single case study involves an intensive investigation of a single case. Bryman and Bell (2011) argue that the crucial question is not whether the findings can be generalised to a wider universe, but how well the researcher generates new theoretical insight and knowledge from the findings.

A multi-firm case study provides a wider breadth of input and creates the possibility to compare and contrast different firms. A theory developed and tested in multiple firms can also make claim to be more generalised than one which is developed only in one firm. However, firms are complex, multi-faceted and constantly changing, with individuals within the firm constantly interacting with other individuals and responding to market and competitive forces. As famously stated by Heraclitus, you can only step in a river once (Heraclitus 402ad, quoted in Plato and referenced in Sedley, 2003), and so trying to compare different firms, in different situations, comprised of different individuals, can cause problems with research validity and reproducibility.

Conversely, a single firm case study can provide much more research depth, and by concentrating on one firm, the researcher can gain a deep understanding of the firm-level complexities and intricacies (Voss et al., 2002). Eisenhardt (1989) argues that the case study research strategy is particularly useful for gaining an understanding of the dynamics present within a single setting, highlighting the benefits of using a single case study approach.

The circumstances of the researcher carrying out the investigation also have a major influence on the selection of a single or multi-firm case study. A researcher that works for the firm under investigation may have privileged access to information about the firm and access to other employees within the firm. Equally, employment in one of the firms under investigation may restrict access to other firms working in the same industry, due to fear of breaching competitive or commercial confidences.

Considering all of the above, it is elected to use a single case study design for this research. Primarily, as the use of a single case study research method will allow a deep investigation into one firm´s behaviour over a prolonged period of time. Also, as the aim of this research is to test the applicability of the ATBV conceptual framework, and not necessarily to compare the behaviour of different firms, a single case study method is more appropriate for this research. As such, it is elected to concentrate the investigation carried out in this research on one particular firm, hereafter referred to as a CasComp.

Selecting to use a single case study is not without its pitfalls, and it is acknowledged that two main drawbacks exist – the potential for bias and a lack of generalisability (Yin, 2013). These two drawbacks are noted and considered in detail in the research limitations section.

Having selected to use a single firm case study, one can now consider the horizontal axis from Figure 13, that of the level of granularity to measure within the firm. On this axis, an examination of the two extreme positions on the axis can be used to explain the decision to be made. It is also worthy of note that the decision on this axis also relates back to the four theoretical perspectives outlined in chapter 2 of this research (Macro, economic, strategic and individual). At one extreme, one can research to a high level of granularity, researching at an individual within the firm. Although no examples were found where researchers have sought to interview all individuals in a firm, the work of Süße and Wilkens (2014) provides an example of research focused more on

individuals than firm-level analysis. Alternatively, at the other extreme, one could consider a holistic perspective and research the firm as one unit, which more closely aligns with the notion of the strategic perspective of the firm.

Within these two extremes of embedded and holistic, it is also possible to investigate certain groups of individuals with the firm, such as functional groups or geographical groups. An example of this type of research is provided by (Morelli, 2003) who considers the impact of a specific group of individuals, in this case, designers, to understand their approach to PSS development. In the research carried out by Morelli (2003) the unit of analysis is a specific group within the firm.

However, in this research is it considered necessary to make a distinction between the unit of analysis and the unit of observation (DeCarlo, 2018). Although these may sometimes be one and the same thing, they can also be, as they are in this research, distinct (DeCarlo, 2018). The unit of analysis in this research is the single case of the firm, as this is the entity this is the principal single case being investigated in this research. The units of observation in this research are embedded within the firm, and the units of observation are two distinct groups within the firm, namely the central managers and the general managers. Such an approach of using the firm as the unit of analysis, and groups within the firm as the unit of observation allows this research to create the bridge between the strategic perspective (where the firm is the unit of analysis) and the individual perspective of the firm (where groups of individuals are the units of observation). This thinking is in line with the earlier discussions in chapter 2, which argued for a need to create a bridge between strategic firm-level investigation and individual subjective level investigation.

5.4.5 Selecting the time horizon for this research

With the unit of analysis and unit of observation selected, it is possible to move onto the time horizon to be considered in the research. Before doing so, it is worth noting that the choice of using a single case study opens up more research opportunities in terms of time horizon. From a purely practical perspective, there is a commitment required from the firm under investigation, and finding multiple firms that can commit to research over a long time period is problematic and raises a risk that firm priorities may change and the research may not be completed.

Thus, focusing on a single case study firm allows an extension of the time horizon selected in scope. This allows for the research not just to look at the firm at one point of time, but rather use a longitudinal approach to research the development and change of the attitudes of the firm´s managers over a period of time. This longitudinal approach is particularly useful as it allows researchers to observe at first hand the sequential relationship of events over a significant period of time (Voss et al., 2002).

It is already noted that use of a single case study method, even investigated over a long time period, can be criticized for its lack of generalisability. One means to overcome this is to ensure that the context-specific case study is investigated using the mechanisms of a more generalisable theory (Yin, 2013). This critique of the single case study method is therefore addressed and generalisability is achieved by using the mechanisms defined in the ATBV conceptual framework.

With the research strategy defined, it is at this point that the more practical question of what data will be collected and analysed for this research. This is addressed in the following section.

5.5 Data collection and analysis process

In this research, the term “data” refers to any unit that can be detected by human senses. This includes visual cues, linguistic information and numerical data. From a research perspective, data need to be considered both in terms of how is to be gathered, and secondly how it is to be analysed. In this research, the data collection strategy involved collecting data from different sources, such as passive observations, participant observations, interviews and other documents such as meeting minutes and reports that were then used to support or question the observations made (Hartmann et al., 2009).

The predominant data collection method used to gather data was observation (Gamst, 1980). This technique gives the researcher first-hand contact with the subject in their natural environment (Gamst, 1980). However, relying on only one data collection method opens up the possibility for research bias, and hence, in this research, to allow triangulation of the data (Denzin, 1978), as well as observation, two additional data collection methods were used; interviews and secondary data. For the observation and interviews, it was necessary to apply a sampling method to decide who to observe and who to interview, and as such a sub-section is provided to explain the

sampling method applied in this research. Similarly, it was considered important to also provide transparency on how decisions were made on which secondary data to collect and analyse, as such a section is included to explain how these decisions were made.

5.5.1 Observation as a data collection method

There is no single agreement on what constitutes observation as a data collection method (DeWalt and DeWalt, 2011). Gill and Johnson (1997) propose that considerations need to be made from two perspectives. Firstly, in terms of researcher identity (concealed or revealed) and secondly in terms of the level of participation by the researcher. A slightly adapted version of the framework proposed by Gill and Johnson (1997) to highlight these different perspectives is provided in Figure 14.

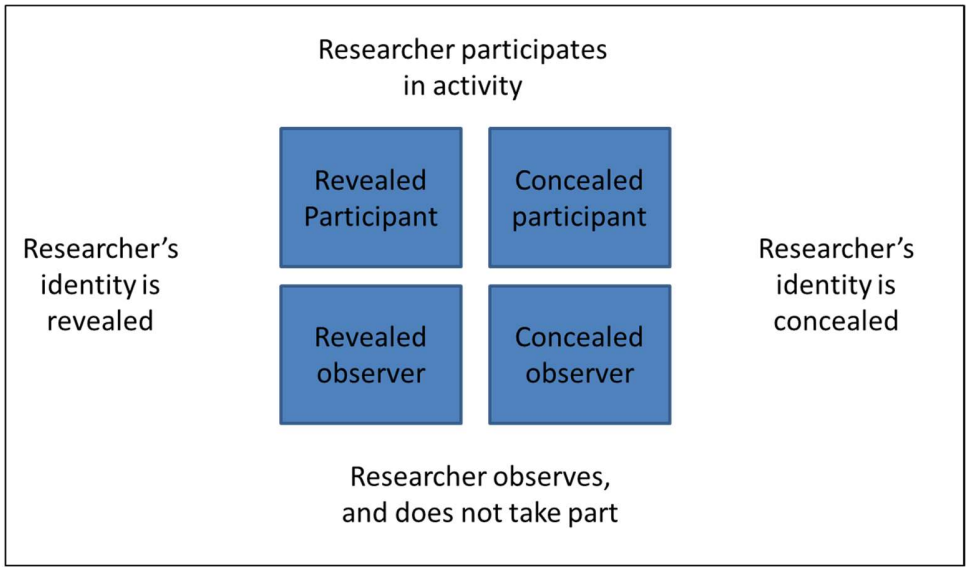


Figure 14 : Options available for people observation in case study research (Adapted from Gill and Johnson, 1997)

The choices made according to this matrix have an impact on both research quality and research ethics. As with many cases in research design, there are advantages and disadvantages of using a revealed or concealed position, or a participatory or observational position (DeWalt and Dewalt,

2011). Often the advantages of selecting one method are the disadvantages of selecting the other, hence in the table below, only the advantages of each choice are provided.

Revealed	**Concealed**
- Reduces the risk of ethical issues as all participants aware of research being carried out - Allows the researcher to use overt recording devices to record information - Allows the researcher to openly check and verify with the group that information has been correctly recorded and understood - Makes explicit what is being researched allows participants to pro-actively contribute ideas that may help the research	- Allows a more natural capture of participants' ideas and thoughts, without the requirement to formally reveal that research is being carried out. - Reduces the risk of participant bias, where participants may withhold information or provide inaccurate information due to concerns on how the information will be used in the final report. - Reduces the administrative burden on the researcher, as revealing that research is being carried out, often results in more questions and details being sought by the participants
Participant	**Observer**
- If the researcher participates in the discussions, and the ideas of the researcher are perceived as positive, then it is likely that the organisation will invite the research to more workshops. Therefore, the advantage of participatory research is that it may facilitate access for the researcher	- Acting only as an observer allows the researcher to be more objective in their approach, as, unlike with a participant, the researcher does not aim to bring in new ideas or influence the group being researched

Table 4 : Advantages of using revealed, concealed, participatory or observatory data collection (author´s own creation using ideas from DeWalt and DeWalt (2011)

Considering first the decision on whether to reveal the researcher's identity (the revealed or concealed axis). The decision of whether to reveal the researcher´s identity has both an ethical impact and also a potential impact on the data collection quality. From an ethical perspective, the researcher must weigh up the ethical impact of not revealing their research, and from a quality perspective, the researcher must consider the impact that revealing they are "doing research" could have on the participants' behaviour and actions, the so-called "Hawthorne's effect" (Wickström and Bendix, 2000). Mckenzie (2009) points out that the lines between revealed and concealed observation are often blurred and that the two terms should best be considered as a continuum. Considering the extremes of the continuum however are useful to explain the position taken in this research. For fully concealed research, a researcher could place secret cameras in offices of the firm and observe participants without their knowledge. Such an idea was rejected on both ethical and practical grounds. At the other extreme, a researcher could fully immerse themselves in the organisation under investigation and seek to influence the behaviour of participants, whilst at the same time observing their behaviour. It was considered that such an approach would have resulted in a high level of researcher bias and would have been more appropriate if an Action Research type strategy had been selected. As it was not, this research sought to observe the behaviour of individuals in the firm, not covertly, but also not from an obvious and explicitly overt position (e.g with the research declaring at the beginning of each observation session that observation was now under way. Such a nuance is worthy of further explanation.

For the full duration of this research, the researcher was also an employee of the CasComp. It would have been possible for the researcher to work as an employee and covertly act as a researcher, but instead, for this research, formal consent was provided by the CasComp to allow the research to be carried out and to ensure that the CasComp was aware that research was taking place. In this sense, the research was done from an overt position, as official approval to carry out the research was explicitly obtained by the CasComp and the researcher made no secret that research was being carried out. However, in terms of observation of the different groups in the CasComp, different degrees of overtness were used. For example, when the researcher observed central managers in senior-level meetings, it was not expressly and explicitly specified that observation was taking place during the meeting. In this case, although observation was not covert (as the CasComp managers were aware at some level that the research was taking place), it was also not expressly revealed. As the researcher worked full time in the CasComp at the time of the research, it was possible for the researcher to observe participants without making an

express point of declaring that researcher was being undertaken, thereby allowing participants to act in their natural environment without the pressure of feeling observed and with the aim that the researcher's presence influenced the behaviour of participants. This can be contrasted with individual interviews which were carried out for this research where, before the interview started, participants were formally informed that the interview was being carried out as part of a research study, and as such the interviews took place from a fully revealed position with participants fully aware that they were being observed for research. It is in such ways, that this research aimed to find the right balance of overtness to ensure no ethical or trust boundaries were crossed, but also not too overt that the researcher influenced participants behaviour or views. A summary of the different levels of participation are provided in Table 5 in the final section of this chapter, but first the related topic of researcher participation is first discussed.

Considering the level of participation of the researcher. Both Pretzlik (1994) and Benjamin (1953, cited in DeWalt and DeWalt, 2011) describes participation and observation as opposite positions on an axis, where any level of participation implies a level of emotional attachment and observation requires complete objective detachment. Benjamin (1953) argues that trying to do both creates a strain between trying to sympathise with participants but at the same time achieving scientific objectivity. Conversely, Spradley (1980) and Mulhall (2003) both identify the possibility of considering the axis as a continuum degree of participation. DeWalt and DeWalt (2011) provides three levels along the continuum, "nonparticipation" is when knowledge is acquired by watching videos or reading diaries for example, "moderate participation" is when the researcher is present at the scene of the action but does not actively look to participate or influence the participants and only occasionally interacts with the people in it and "active participation" is when the researcher actively engages in almost everything the other participants are doing, as a means to fully integrate themselves with the participants. This research made use of different levels of participation depending on the contextual situation being observed within the CasComp. For example, the researcher was granted access to senior-level (C-suite) meetings to discuss the CasComp productization strategy. In these meetings, the researcher played a purely observational role with no participation. In other meetings (management meetings below the C-suite level), the researcher played a more moderate participation role, only providing input and ideas when called upon, and largely focusing on observation. Data from meetings and workshops in which the researcher was an active participant were not included as data for this research, as it was found that actively participating in a meeting and trying to collect data at the same time was not practically possible. The degree to which the researcher's position was revealed or concealed

and the level of participation of the researcher is summarised in subsequent sections of this chapter and summarised in Table 5.

As the data collection for this research was carried out while the researcher worked as a full-time employee of the firm under investigation (the CasComp), the ideas of LeCompte and Schensul (1999) were also considered relevant. LeCompte and Schensul (1999) draw attention to the researcher status position which can have an impact on research design from two perspectives. On one hand, the social status role of the researcher may have an influence on the expected level of participation of the researcher – as an extreme example, if the researcher were the CEO of the firm being observed, it is likely that the participants would expect participation in discussions and debates, whereas a more junior researcher may be largely overlooked and ignored. Furthermore, the social status of the researcher also restricts the possibility for replicability of ethnographical research, as the flow of information will be dependent on the researcher's social status position. For example, a researcher who works inside the firm and is perceived by the participants as a competitor for a promotion may be provided with different information than a researcher who is not perceived as a competitor for the promotion. In all of these examples, there remains no "right" position for the researcher to take, but rather it is down to the researcher to recognise and acknowledge the influence and impact of their social position amongst the participants and understand the possible implications and limitation this has on data collection.

In terms of the researcher's social status within the CasComp, the researcher did hold a mid-level management position in the CasComp at the time of the data collection and it is noted that this could influence the data collected. On one side, the researcher's role was advantageous, as it permitted observation of senior-level of meetings and discussions, but on the other hand, it does open the possibility to researcher bias, especially if the researcher has too much of an influence on participants' responses and, or too much emotional attachment to the ideas. In the interests of transparency, the researcher's role can be described as being part of the team reviewing the possibility of pursuing a productization strategy, but not the person directly responsible for opting to pursue the strategy, nor delivering it. From this, the researcher aimed to maintain a neutral, objective position on whether the company should pursue a productization strategy and observe rather than influence the decision-making process. Such an approach aligns with Voss et al., (2002) who explains that the neutral researcher is interested in capturing the results of different interventions, whereas a consultant and active participant is more interested in giving recommendations and implementing them.

5.5.2 Data collection framework used to collect observed data.

The practical method used to collect empirical data also has an important influence on the observation technique (Pretzlik, 1994; Mulhall, 2003). Mulhall (2003) makes a distinction between structured and unstructured data collection. In this, structured observation is a discrete activity whose purpose is to record physical and verbal behaviour and an activity in which the observer aims to stand apart from the participants in an attempt to collect data in an objective manner without contaminating the data with their own preconceptions. In contrast, unstructured observation is used to understand and interpret social behaviour (Mulhall, 2003). The main method used to collect unstructured data is the use of field notes. However, the use of field notes to collect data for scientific research generates a number of secondary questions. For example, what does the researcher observe, what do they chose to focus their attention on, what do they subsequently recall, of what they remember, what do they chose to document in their notes and to what level of detail (Wolfinger, 2002)? This research made use of a semi-structured data collection method, where the data to be collected were not strictly specified at the start but instead, data collection was guided by the mechanism in the ATBV conceptual framework and a number of interview questions outlined in later sections.

First, the next sub-section explains how the ATBV conceptual framework was used to provide some structure to the data collection.

5.5.3 Use of the ATBV conceptual framework to collect observed data

Being an employee at the CasComp provided regular and frequent opportunity to observe managers within the CasComp discussing the idea of developing a PSS productization strategy. Specifically, the researcher was given access to attend and observe internal, supplier and customer meetings where the subject of productization was on the agenda. In particular, the researcher was invited to eight quarterly innovation board meetings throughout the 2-year research period. These board meetings lasted 2 (sometimes 3) days and were attended by the Chairman of the CasComp and a selection of the C-Suite management team (different members attended different meetings, but the Chairman or Chief Executive Officer was present at all). This

equated to observations of 184 hours of the central management team deciding the direction and future strategy of the firm.

These innovation board meetings provided insight into the perceptions, attitudes and decisions of the central management team at the CasComp and provided valuable data in understanding the decision to consider the development of a PSS productization strategy as a productive opportunity to be exploited by the CasComp. To collect the data, the research aimed to collect comprehensive notes (Wolfinger, 2002), but in some observation sessions (some of which lasted more than 10 hours) it was not possible to record all data. In this case, the researcher used the salience hierarchy method (Wolfinger, 2002), focusing in particular on any discussions related to firm-level growth or topics related to PSS productization.

To minimise bias as much as possible from the salience hierarchy method, the ideas of Spradley (1980) and Lofland and Lofland (1984, cited in Wolfinger, 2002) were heavily drawn upon. Spradley´s (1980) proposal of collecting data using 9 dimensions, such as noting the actors involved, the activities discussed and the timing of the discussions was used to capture a broad range of data. In particular, the researcher looked for points of emotion (one of the 9 dimensions proposed by Spradley (1980) as this often indicated strong feelings (or beliefs, to use the terminology in the ATBV framework) held by certain actors within the firm. In addition to Spradley´s 9 dimensions (Spradley, 1980), the ideas of Lofland and Lofland (1984, cited in (Wolfinger, 2002) who recommend having a list of questions in mind when collecting data was also used to guide the data collection. The list of questions used is provided in a later section of this chapter.

At these observation sessions, particular attention was taken to capture information about the beliefs and attitudes of central managers using established methods developed from the Theory of Planned Behaviour (Ajzen, 1985, 1991; Fishbein and Ajzen, 1977), as these beliefs and attitudes form a key mechanism within the ATBV conceptual framework.

As the term beliefs and attitudes are used frequently in the following section to describe the data being collected, a definition of each is provided here. A belief is defined as an underlying influencer on an individual´s attitude towards performing a specific behaviour (Madden et al., 1992). An attitude then is defined as a collection of beliefs towards performing a specific behaviour or action.

The common method used to capture information about beliefs and attitudes is that questions are asked, either by survey or interview, to understand the underlying beliefs and attitudes of an individual (Ajzen, 1991) as means to investigate and understand their behavioural intentions and actual behaviour. In this research, a different approach was used, in that the behaviours of central managers within the CasComp were observed over a 2 year period, but specifically in the quarterly innovation board meetings, and this observed data was used to understand the underlying beliefs and attitudes that were driving that behaviour. The research from Conner and Armitage (1998) also indicate that individual's beliefs are best uncovered during unsolicited free elicitation, an argument that supports the use of observation as an appropriate method to collect data for the ATBV conceptual framework and as means to capture data about the beliefs of central managers within the CasComp

For this research, any expressed beliefs related to the PSS productization strategy that were observed were captured in written form by the researcher, noting the date, time, context (e.g meeting, workshop, informal setting) and name and position of the individual, and also answers to any of the relevant eight guiding questions for observational research provided by Lofland and Lofland (1984) and the 9 dimensions proposed by Spradley (1980). An example of the notes taken at one of the CasComp meetings is provided in the annexe of this research.

In the theory of planned behaviour (Ajzen, 1991), it is recognised that an individual may have many different beliefs about an idea, but the theory of planned behaviour (Ajzen, 1991) indicates that only a small number of beliefs, typically 5 to 9 so-called salient beliefs, form the attitude which leads to behaviour (Conner and Armitage, 1998).

The data collection method used created an extended list of beliefs from different individuals inside the firm about the PSS productization strategy. To identify the salient beliefs from this extended list of beliefs, the theory of planned behaviour suggests that beliefs should be measured in terms of their strength and their importance (Fishbein and Ajzen, 1977). This research also uses these two principal measures, with the strength and importance being assigned by the researcher based on the observed behaviours of the central managers.

In terms of the importance of the belief, this was measured in terms of the frequency that the belief was discussed by central managers. A belief that was mentioned and observed frequently

was considered to be more important than a belief that was mentioned infrequently. Thus, a belief that was only mentioned once was considered as not too important and assigned the lowest importance score of 1. A belief that was mentioned frequently and was observed to be important for the central manager was assigned the maximum importance score of 5. The importance scale of 1 to 5 was then applied by the researcher to any other belief observed. In this way, each belief was assigned a score of 1 to 5 to measure its importance.

In terms of the strength of the belief, this was also measured on a scale of 1 to 5. The measure of strength was based on the level of certainty with which central managers expressed their belief. For example, some beliefs were proposed by central managers with absolute certainty. These beliefs were assigned a strength score of 5. Other beliefs were proposed more tentatively, and with less certainty, these were scored with a strength score of 1.

It is noted that the scoring of the strength of each belief was subjectively applied by the researcher. However, the ideas of Spradley (1980) were drawn upon, and in particular, a focus was on recording the language and emotion observed to allow the researcher to assign a score. For example, when participants used terms such as “I think…” or “I believe…” this implied less certainty, in contrast to when participants used terms such as “I know…” or “I am sure..” which implies a higher level of certainty. It is noted that participants may have deliberately or subconsciously projected more certainty to certain ideas than they held in reality, but the focus on data collection was on the projected and observable emotions and statements, rather than trying to second guess any underlying strength of beliefs. As such, the strength scale of 1 to 5 was applied by the researcher to each of the beliefs observed from the participants. In this way, each belief was assigned a strength and importance score of 1 to 5. The strength score is then multiplied by the importance score (S x I) and from this, each belief is given a score of between 1 and 25. Each of the observed beliefs is ranked by this number (S x I) and those beliefs with the highest score are considered as the salient beliefs.

Although Fishbein and Ajzen (1977), measured beliefs in terms of strength and importance, (Ajzen, 1991) later recognised the importance of measuring other variables:

“The theory of planned behavior is, in principle, open to the inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behavior after the theory’s current variables have been taken into account”. (Ajzen, 1991, pg 199)

Following on from this, Krosnick and Abelson (1992) make the case for measuring the strength and importance of beliefs, but the authors go further and argue that beliefs should be measured in terms of what they refer to as “extremity”. This extremity refers to the degree of favourableness or unfavourableness towards the idea. In this research, this idea of extremity is used, but this is represented by the “Direction” of the belief as it is considered direction is a more appropriate label than extremity, which implies an association with belief strength. Thus, a belief that is considered as favourable towards a new productive opportunity is considered as a belief with a positive direction. A belief that is considered as unfavourable towards a new productive opportunity is considered as belief with a negative direction.

This research also captured data on an additional predictor, that of “consistency” of the belief. This is used to reflect that this research was not looking to measure the belief of any one individual (as is the case for the theory of planned behaviour), but instead, the research aimed to understand the collective beliefs of a group of individuals, in this case, the central management team. Consistency is included as it is argued that if all of the group have the same belief (in other words, there is a high level of consistency of the belief across the group), then collective action and decision making is more likely. Thus, the consistency score reflects the level of agreement amongst the group on a particular belief. A belief which many managers shared is given a high consistency score of 5, a belief which was not shared by the collective group, and, was subject to much discussion and debate was given a consistency score of 1.

To ensure a focused scope for this research, only those beliefs associated with the development of a PSS productization strategy were recorded. Thus, specifically, this research aimed to identify the salient beliefs among central managers within the CasComp that were related to the idea of adopting a PSS productization strategy. Any belief observed was then measured across the four dimensions of Direction (D), Importance (I), Strength (S) and Consistency (C). These four dimensions are summarised below:

a) The direction (D) of the belief: Either positive or negative towards pursuing a PSS productization strategy.
b) The importance (I) of the belief: Where 5 is considered as a very important belief when deciding whether to pursue a PSS productization strategy and 1 is considered as a not very important belief.

c) The strength (S) of the belief: Where 5 is considered as a strongly held perceptions and 1 is considered as a weakly held belief.
d) The Consistency (C) of the belief across the central management team. Where 5 refers to a belief that is held consistently by all members of the CasComp Central Management and 1 is a belief where different members of the CasComp have different, alternative beliefs.

The (D), (I), (S) elements of measuring beliefs are widely used to measure beliefs and attitudes and form a core part of the theory of planned behaviour (Ajzen, 1991). However, in this research, a new element is introduced: (C) consistency. Together, the 4 elements combine to create a DISC score for each belief. To summarise the overall dimensions of each belief, each belief is attributed as either a positive or negative sign, depending on the belief (D) Direction, and then the sign is applied to the resulting number derived from multiplying the (I), (S) and (C) scores. Although this provides one neat number for each belief, it is important to note that the individual (I), (S), and (C) components contain important insight that should not be overlooked. Hence, when data are provided in the following chapter, the individual components of the DISC score for each belief are provided.

This section has provided in detail the data collection methods used from observational data collection and the DISC analysis methods used to analyse that data. In line with the triangulation approach adopted in this research, data collection was also carried out by means of interviews. The following sub-sections explain how interviewing was also used as a data collection method in this research.

5.5.4 Interviews as a data collection method

An interview is defined as a conversation with a purpose (Webb and Webb, 1932). The interview is a prominent data collection strategy in both quantitative and qualitative research (Bryman and Bell, 2011). Although Webb and Webb (1932) provide a simplified definition of an interview, the interview is multifaceted and requires considerable thought and design for data collected using interviews to be of use in academic research. There appears to be no common agreement on one “right” interview technique, but rather the right interview technique in light of the research questions being asked, access to interviewees and the depth of the data required.

Different authors have proposed different interviewing techniques. Saunders et al. (2012) make a distinction between formal and informal interviews and structured and unstructured interviews. Douglas (1985) promotes the idea of creative interviewing, where researchers do not follow strict "how-to" rules, but rather continuously adapt themselves to the ever-changing situations that the interview may create. Similarly, Rubin and Rubin (2011) refer to a type of interviewing described as "responsive interviewing", where the researcher focuses on interviewing people who are knowledgeable about the subject under research, listen to what they have to say, and ask new questioned based on the answers provided.

Although the primary data collection method used in this research was observation, interviews were also used to gather additional complementary information and data. The interview technique used was the semi-structured interview technique, as this method is most appropriate for exploratory type research and permits the use of the responsive interview technique (Rubin and Rubin, 2011) to gain both breadth and depth of understanding.

George et al., (1996) suggest the use of an interview protocol. For this research, this interview protocol consisted of four key components. The first component relates to whether to interview individually or in groups (Bryman and Bell, 2011). The latter can in some cases generate more ideas as the interviewees discuss and debate amongst themselves, but the potential downside is that interviewees may be influenced by other people in the group and not all opinions and ideas captured. Access to interviewees is also a key consideration, and just being around when someone is ready and available to talk is often what is needed for a successful interview (Rubin and Rubin, 2011). As such, this research used a combination of group-based interviews and individual interviews, with a record taken of whether the data were collected in the former or the latter.

The second component of the interview protocol is the selection of the interview format, namely whether to interview people face to face, via telephone or video conference. When possible, interviews for this research were carried out in person. However, as the CasComp is a global organisation, with employees spread around the world, most interviews were carried out by telephone when it was not practically feasible to conduct the interview in person.

The third component of the interview protocol is the sequence and organising of the interview. For this research, each interview six key steps were followed; The arrival, introduction to the research, beginning the interview, the interview itself, ending the interview and after the interview (Legard et al., 2003).

The fourth component of the interview protocol is the decision about how to collect and record information during the interview. Although some authors recommend that all interviews should be audio recorded (Legard et al., 2003), this overlooks the benefits and drawbacks of this method and also discounts other options for recording data in the interview, such as videoing the interview, taking notes during the interview, or writing up notes after the interview. Although the benefits of audio recording are clear, as it frees up the researcher to concentrate on asking questions and not writing detailed notes, it should not be overlooked that recording an interview may also make the interviewee less candid in their answers and can inhibit interviews (Voss et al, 2012), resulting in not all information being revealed. For this research, most data were captured by taking notes during the interview, but a select number of interviews were recorded and transcribed for detailed review (see appendix for examples).

In terms of the purpose of the interview, the aim was not to get a right answer from the respondent, nor evaluate the responses. Rather, the purpose was to gain an understanding of the experience of the interviewee and their understanding and meaning derived from their experience (Seidman, 2013).

To achieve this objective, selecting the right questions to ask is clearly of high importance. Legard et al. (2003) advise using a combination of questions to achieve both breadth and depth.

The core questions that were used as the basis for the semi-structured interviews are provided below:

1. *Is the CasComp growing today?*
2. *In your view, why is it growing / not growing?*
3. *What do you think is helping / hindering growth?*
4. *The CasComp gets most of its business today from providing services, but recently started moving into manufacturing as a means to grow the business. What do you think made the company consider seeking to grow by moving into manufacturing?*

5. *In your view, is the company reacting to an external factor with this strategy, or is the decision to add manufacturing proactively driven from inside the organisation?*
6. *What benefits do you foresee if the company moves into manufacturing?*
7. *What challenges do you foresee for the company to move into manufacturing?*
8. *How ambitious do you think the company is about getting manufacturing?*
9. *In 5 years' time, what % of the company's revenues do you think will come from manufacturing?*
10. *What makes you think that?*
11. *If the company wanted to make it 50% of revenues, what would need to change?*
12. *Have you ever worked as an employee of a manufacturing organisation before? For how long?*
13. *Do you believe there are any differences between service companies and manufacturing companies? If yes, what differences do you believe exist? Can you give me an example of any differences you have noticed?*

Equally important as the questions being asked is the questions that are not asked, and the reason for their omission. Firstly, specific research terms such as PSS and productization were not used in the interviews, as the former is not widely known in the industry, and the latter suffers from several ambiguous definitions, and hence is open to misinterpretation and confusion. Secondly, it was deliberately elected not to ask the interviewees their opinion on whether the move to adopt a PSS productization strategy (or manufacturing strategy as the strategy was referred to in the CasComp) was a good or bad idea, as this could put interviewees in the awkward position of having to agree with their management decision to pursue this strategy.

Additional details about the interview protocol used as well as the rationale for selecting the questions are provided in the annexe of this research.

The above section has laid out in detail the observation and interview methods used to collect data for this research. One key question remains, which is how it was elected who to observe and interview. Due to the importance of this question, a section is dedicated to explaining the sampling techniques used to collect observational and interview data.

5.5.5 Sampling techniques used to collect observational and interview data

In a global organisation of 15,000 employees located all around the world, decisions were needed on which employees to interview, which meetings to observe, and which secondary data to consider in the research.

Looking first at the interviews and observation, a quantitative sample selection technique indicates that 375 employees would need to be interviewed or observed to achieve a statistical sample with a confidence level of 95%. However, this quantitative method, although statistically correct is not considered as appropriate for this research. Firstly, different employees within the organisation will have different levels of influence on organisational decisions and strategy. The opinion of the CEO for example, of which there is only one, would arguably have more impact on the firm than the opinion of a local operator, of which there are thousands. Therefore, a random sampling of 375 employees would not be appropriate. Furthermore, interviewing or observing 375 employees would go beyond the practical time constraints available for this research.

Thus, rather than a statistical sampling technique, the sampling method provided by Hammersley and Atkinson (2007) was used. In this, the authors propose that sampling must take place in terms of time, people and context. In terms of time, it is recognised that activities and opinions frequently vary over time and hence temporal changes must be considered. For this, the research regularly collected data over a 2-year period. The quarterly innovation board, of which 8 were attended over the research period, ensured that not all data were collected in one short time period, which would result in providing a distorted picture of reality. Additionally, semi-structured interviews and semi-structured discussions were held regularly over the 2-year research period. This collection of data over an extended time period is considered key, as case study research data that is collected in only (for example) one short intensive period can easily be distorted by one-off major incidents (such as news of a big business win, a profit warning or round of redundancies). Temporal sampling was therefore ensured by collecting data evenly over a 2-year period.

Hammersley and Atkinson (2007) propose that sampling of people will almost invariably be required, as no setting will prove socially homogenous in all respects. The authors provide three approaches: demographic categories, observer identified categories, and member identified categories. It has been elected not to use demographic categories, as although it is recognised that demographic analysis could be of interest (for example if women in the organisation have

different opinions to men), such analysis is not relevant for the research questions set out in this research. Instead, the categories specified in the ATBV conceptual framework were used to group and specify the individuals inside the firm. Three categories were identified:

1) Members of the central management team: In other words, the central management team who set and formally set the direction of the firm. In this research, from the central management team, the Chairman, Chief Executive Officer, Chief Technology Officer and Global Head of Logistics were observed during regularly quarterly innovation board meetings. This represented regular data collection from 4 of the 9 most senior management team in the firm; the Chief HR Officer, Chief Legal Officer, Chief Finance Officer, and the Global Head of Air and Global Head of Ocean did not regularly attend the innovation board meetings and thus their insight was not included in this research. In total, approximately 184 hours of observation and interviews were conducted for this group.

2) Members of the general management team: In this category was any manager who was not part of the central management group, but who held the title of manager in the firm. It is estimated that there are approximately 1500 managers in the firm, but many of which were not involved and not directly impacted by the PSS productization strategy, thus aiming to interview all or even a representative sample of the full population would have been both unpractical and of limited use. Instead, interviews and observation were focused on those managers who were actively involved or who were considered close to the productization strategy. In this research, 30 different CasComp managers were observed and interviewed. Excluding informal and short discussions and only considering formal meetings and workshops, approximately 236 hours of observation and interviews were conducted for this group.

3) Members of the operational team. In this category is any member of the firm that was not in the first or second group. This mainly included warehouse operators, supervisors and administrative clerks. This group represents approximately 13,000 employees. Although this is the largest category in terms of individuals, a small number of sample interviews indicated that this group had little influence on the decision of the firm to pursue a productization strategy, and hence this group were not observed nor interviewed for this research.

In addition to the three categories of employees inside the firm, the researcher had the opportunity to observe and interview a number of external people (external to the CasComp) whose input provided insight considered useful for this research. These external individuals included:

- 8 individual managers who represented 5 different firms that were target customers for the CasComp
- 4 individual managers who represented 2 different firms that were suppliers to the CasComp

In total, 16 hours of observation was carried out for this group of external individuals.

The above categories represent the sample group of individuals who provided insight for this research, either by participating in an interview or by participating in a workshop that was observed as part of the primary research for this research. In the research findings the following labels are used to indicate the source of the data:

CM : Central Management. Members of the Central Administrative Control Group
GM : General Management. Member of the firm general management group
ES : External source. Individuals who were external to the firm.

As multiple individuals were interviewed and observed from each group and also to maintain anonymity for those interviewed, each individual who provided data was then coded with the group to which they belonged and assigned a unique number.

Lastly, Hammersley and Atkinson (2007) propose that sampling should take place based on context, with this final perspective equally as important as the temporal and people dimensions. The authors argue that people act and behave differently depending on the context and cite the example of teachers behaving differently when they are in a classroom, in a staff room just amongst teachers, and a staff room when there are visitors. This contextual sampling is also relevant for interviewing and observation, and a number of different contextual settings were observed to elicit data. The contextual settings included collecting data in more formal review sessions, such as the company's quarterly innovation board meeting, formal customer review meetings, regular internal workshops and informal discussions and meetings.

Although interviews were used to complement the primary data collection method of observation, in total, more than 42 different individuals were interviewed – 30 of which were employees of the CasComp and 12 were external to the CasComp. For the majority of interviews, written notes were taken to record the responses. Within the interviewees, five were with senior head office managers at the company, three of the interviewees agreed for the interviews to be recorded and transcribed.

Table 5 is provided to summarise the primary data collected for this research. The table also provides visibility on the degree of revealed or concealed position of the researcher as well as the degree of participation of the researcher during the data collection. As indicated in Table 5, varying degrees of researcher overtness and participation were used to gather data from different groups. For example, when observing central managers in the innovation board meetings, observations were carried out from a concealed status. That is to say, in those meetings, although the central managers were aware research was taking place about the company, central managers were not explicitly advised that their behaviour in the innovation meetings was being observed. Thus, although the status of the researcher was not deliberately concealed, nor was it explicitly revealed. As the researcher attended the innovation meetings, not as an active participant, but only to take notes and minutes for the meeting, this allowed the researcher to take detailed research notes during the meetings without explicitly revealing that research notes were being taken and without having to play an active participant role in the meetings.

When observing general managers, a more nuanced and pragmatic level of researcher covertness and participation was required. In terms of the level of covertness, a similar approach to revealing that research was taking place was used for general manager meetings as it was for central manager meetings. That is to say that no deliberate steps were taken to try and conceal that research was being carried out, but equally nor were any deliberate steps taken to explicitly reveal or declare that observations were taking place. It is noted, however, that due to the researcher having more regular contact and interaction with general managers (than central managers), many general managers were likely to be more aware that some of level of research was taking place, than that of central managers, who only had very limited interaction with the researcher outside of the quarterly innovation meetings. In terms of the level of participation during the general manager observations, the level of participation of the researcher was higher during general manager meetings than central manager meetings, as for general manager meetings, the researcher was frequently invited as an employee of CasComp with the expectation

of employee level participation, whereas when the researcher was invited to central manager meetings, the researcher was invited to write up meeting minute notes.

That said, the meetings involving general managers often covered a number of different sub-topics (as illustrated in annexe 3 where the separate sub-topics of productization and 3D printing were discussed), which allowed the researcher to participate as an employee when discussing certain sub-topics, but also switch to being a researcher (and not participate as an employee) during discussions on other sub-topics. A deliberate mental switching model was used by the researcher, switching to employee level active participation mode during some discussions and switching to researcher non-participant observation mode during other discussions during the general manager meetings. It is noted that such nuanced observation methods, in which in some parts of the meeting the researcher participates as an employee and in other parts of the same meeting, the same individual participates as a researcher, could result in unintended research bias. This potential for bias is considered in more detail in the assessment of research quality (section 5.6).

The data collected from observations of external, non CasComp employees were minimal compared to the data collected from CasComp employees, and as such less emphasis was placed on selecting the right balance of researcher covertness and researcher participation for external, non CasComp observations than that of observations of CasComp employees. For completeness, the level of researcher covertness and researcher participation of observations of external, non CasComp employees is also provided in Table 5.

As a final point, It is also noted that the primary data collection focused principally on addressing RQ2 of this research, as this question related specifically to understanding how management attitudes and management time allocation influence the behaviour of a firm that seeks to grow.

#	Data collection method	Degree of the revealed status of the researcher	Degree of participation of the researcher	The framework used for data collection	Data collection details	Participants observed
1	Observation of CasComp Central managers	Central managers were aware that CasComp was being investigated, but Central Managers were not explicitly informed that they were being observed	Minimal participation of researcher. Researcher attended meeting purely to take notes and write meeting minutes and did not participate in discussions.	ATBV conceptual framework and DISC	184 hours of observation at the innovation board meetings	4 of 9 of the CasComp central management team
2	Observation of CasComp general managers only	CasComp general managers were aware that CasComp was being investigated, but general managers were not explicitly informed that they were being observed	Some participation of researcher, but only when specifically requested to provide input during meetings. When the researcher was participating, observation and data collection stopped (due to the practical difficulties of	ATBV conceptual framework	236 hours of observation at CasComp workshops	30 general managers

			participating and observing in parallel)			
3	Observation of external, non-CasComp employees.	External, non-CasComp employees not informed they were being observed.	Some participation of researcher, but only when specifically requested to provide input during meetings. When researcher was participating, observation and data collection stopped (due to the practical difficulties of participating and observing in parallel)	ATBV conceptual framework	16 hours of observation with external, non-CasComp employees)	12 external (non-Cas Comp managers)
4	Semi-structured interviews with CasComp employees	CasComp employees explicitly informed that interviews were being used for this research.	Researcher participated as interviewer to ask questions.	Interview protocol	45minute to 1-hour interviews with CasComp general managers	30 employees of CasComp (including 5 senior head office managers).

Table 5 : Summary of primary data collected

As well as the primary data collected through observation and interviews as outlined above, field notes were also supplemented by regular short meetings and discussions with CasComp

employees. In addition to primary data, secondary data were also collected related to the CasComp. The secondary data collected for this research are discussed in the following section.

5.5.6 Secondary data collection

Secondary data collection is defined as using data that others have generated or collected (Bryman and Bell, 2011). Firms generate large amounts of data, such as payroll details, copies of letters, minutes of meetings and accounts of sales (Saunders et al., 2012). To this, one can add the increasing volume of digital records such as video releases, interviews and all other digital communication methods (social network feeds and blogs for example). As well as firms generating data internally, external parties such as governments, competitors, research agencies and the press may also generate data about the organisation. Together, analysis of these secondary sources of data can help to provide insight into the firm.

Secondary data collection was used throughout the research. It was used initially to collect wider industry data on the logistics industry, and then secondary data from the CasComp itself was also collected to complement the primary data from the CasComp.

One advantage of using secondary data analysis is its reproducibility. In effect, if the data are published and available and unchangeable, it should be possible for any researcher to access the same data, and if the analysis is done correctly, reproduce the same results. However, it is also noted that digital records and information made available through websites can be changed and updated over time, so the use of digital records can be problematic and it should not be assumed that the published data are fixed.

Although using non-digital data has the benefit of being highly reproducible, there is significant potential for bias in secondary data collection, both from the researcher perspective and the participant perspective. For example, faced with large amounts of secondary data, it is possible that the researcher only takes note of information and data that confirms their personal view. Similarly, one cannot assume that all data and information are made available by the firm or participants in the research. Selective release and access to data (deliberate or accidental) can result in research bias. Another challenge of secondary research is its external validity (Saunders et al., 2012), and whether the conclusions from secondary research can be generalised in other

contexts. The focus in this research design was therefore on making sure the secondary data collection method used was externally valid and that the method used can be repeated and applied in different firms.

To reduce the risk of bias and external validity, a systematic method of secondary data collection was used. The systematic approach involved detailing the sources of information that were to be considered, thereby reducing the risk of information being overlooked. A triangulation method was also applied, whereby information that the firm had made publicly available was used as the primary source of information. Any internal information published by the firm was used as a secondary data source and used mainly to verify and add additional depth and detail to the external data. Lastly, external publications (not published by CasComp) were considered to complete the triangulation approach.

The purpose of this approach was to reduce the risk of researcher bias. By using externally, publicly available information as a primary source, the reader can also verify the findings and access the same information. Although as an employee of the CasComp, the researcher had access to more detailed archives and information, these were only used to add depth and detail to the data from publicly available archives.

To facilitate external validity and allow other researchers to replicate the approach for other firms, the secondary sources that were read and considered as data sources are provided below. As all of this information is common to most publicly traded firms, this makes it possible to replicate the approach used in any other publicly traded firms. This approach also reduced the risk of participatory bias, as all of the information below is available in the public domain and some sources (annual reports for example) are legally required to be produced and made available.

The publicly available archival material produced by CasComp (any item published between 2012-2016) included:

1) Company annual reports
2) Company communications to shareholders
3) Company financial updates (e.g quarterly market updates)
4) Company media releases
5) Published articles or blogs by employees of the company

6) Published videos

In addition to publicly available information, as an employee of the CasComp, additional internally available data were accessible. These internal data were used to add depth and deeper organisational understanding to the research.

The following sources of internally available data produced by CasComp (any item published between 2012-2016), were used as sources to add depth to the external information.

1) CasComp internal website
2) Internally available meeting minutes
3) Internally available PowerPoint slides from workshops
4) Internally published communications

The sources of publicly available data and material produced by external parties (any item published between 2012-2016) were also considered and used.

1) Published articles or blogs about the company (published by individuals external to CasComp)
2) Industry reports about the company

The previous sections have laid out how data were collected from observations, interviews and secondary data. Although details have been provided about the DISC method used to analyse data collected about beliefs and attitudes of central managers, the following section provides additional details on other data analysis techniques used to analyse and structure the data collected.

5.5.7 Data analysis techniques

In line with recommendations provided by Miles and Huberman (2014), data for this research were analysed on an ongoing basis, not only when all data was collected. The purpose of this approach was to identify gaps in the data during the process of collection and to allow for the

research to identify ways to improve the data collection throughout the entire data collection period.

Primary data collection (observational and interview) was generated and created from detailed notes and also with the creation of meeting minutes and PowerPoint slides which were sent to the participants of any observed workshops to check for understanding and completeness. The data collected comprised of both elicited (written specifically for the research) and extant texts (texts not written specifically for the research) (Gale et al., 2013). The data were then analysed and framed within the mechanisms of the ATBV conceptual framework, and drawing on the 5 step approach to data analysis proposed by Pope et al., (2000). The five-step approach to analyse the data collected can be summarised as:

1) Familiarisation analysis was carried out. This is an approach involving a pragmatic selection of the data, reading of documents, studying notes and listening to interviews in order to list the key ideas, recurrent themes and identify any contradictions.
2) The ATBV conceptual framework was then used to organise and frame the data.
3) The data was then mapped onto the ATBV framework to examine and structure the data. The end product of this stage was a detailed mapping of the data onto the ATBV conceptual framework and the labelling of data into manageable chunks for subsequent retrieval and exploration.
4) From this, the data were distilled and summarised.
5) Finally, the data were analysed to find associations between the data to seek to explain the associations.

Any beliefs identified from the observed data were noted, with an initial indication of the DISC score observed (based on a subjective interpretation by the researcher). An example of the coding done from an observed meeting is provided in annexe 3. This coding data were then transferred to an excel file, where duplicates were removed and DISC scores were checked and adjusted by the researcher when beliefs were observed from multiple meetings. For example, some beliefs were observed in numerous meetings, and when beliefs were frequently detected, they were given a higher “importance” score than those that were detected less frequently. The approach used to rank the salient beliefs observed within the CasComp and the ways in which the DISC score method was applied is explained in more detail in section 5.5.3. Although a large list of beliefs was collected, in line with the theory of planned behaviour (Ajzen, 1991), only those beliefs

that were considered salient, in other words, those six to eight beliefs with the highest strength and highest importance score, were then included in the findings section of this research.

Secondary data collected within the CasComp were also analysed using textanalyser.net to identify commonly used words and phrases and to create word clouds and text-based analysis to look for common themes and also identify patterns of data. Financial information for the analysis of the logistics companies was extracted from SP Global Market Intelligence and put together to measure revenue, profit, fixed assets and number of employees over a 10-year period to understand how the selection of different growth measures could result in different interpretations and conclusions about the firm´s rate of growth. Additional output from the financial analysis is provided in the annexe.

The previous sections have laid out in detail the core components of the research methodology used in this research, from the underlying research philosophy to the detailed techniques used to analyse the data. The next two sections are focused less on explaining the research methodology and more on assessing the research methodology. The research methodology is assessed form both a quality and an ethical perspective, beginning with a quality assessment in the next section.

5.6 Quality criteria used to assess the research methodology used in this research

The trustworthiness of qualitative research is often questioned by positivists (Shenton, 2004). With qualitative case study research, in particular, being criticised as it is often carried out without a concern for design quality (Yin, 2013). To address this critique, this research considers first the question of how to assess the quality of the research methodology, in other words, what are the quality criteria against which this research methodology should be held, and then, once the criteria are defined, it is considered how well does this research methodology stand up against the criteria defined.

5.6.1 Defining the quality criteria for this research methodology

Considering the different research paradigms, and their different ontological, epistemological and axiological perspectives, it is not surprising that there are different perspectives on how to assess the quality of the research methodology. Saunders et al. (2012) point to three different approaches

that can be applied by researchers. One option is to take the traditional canons of inquiry, developed within the positivist paradigm, and use the same label but adapt the application to social science research. The second option is to adapt the traditional labels such as reliability and validity, to terms more resonant with social science research, such as dependability and credibility (Guba, 1981). The third option is to move away from the traditional canons of inquiry and develop completely new criteria to be used to assess the quality of social science research. Applying any one of these three approaches opens the possibility of accusations of adjusting the quality criteria, an accusation that this research aims to avoid.

Thus, to assess the research quality of this research, all three of these options are considered. First, the ideas of Bryman and Bell (2011) and Saunders et al. (2012) were used to provide a broad view of the criteria that should be used to assess research quality, using the traditional scientific canons of inquiry of reliability, replicability, construct validity, internal validity and external validity. Second, the ideas of Zachariadis et al. (2013) were considered, as the authors argue that a distinction should be made between assessing quantitative and qualitative research, with each research type being assessed against different criteria. Namely, design validity, measurement validity and inferential validity for quantitative research and design validity, analytic validity and inferential validity for qualitative research. The design criteria proposed by Zachariadis et al. (2013) is particularly useful for this research as it specifically addresses the perspective of research quality carried out through a critical realist paradigm. Thirdly and lastly, this research draws on the ideas of (Yin, 2013), who argues that the four tests of construct validity, internal validity, external validity and reliability are the most appropriate criteria to assess case study research such as this.

It is noted that there are areas of overlap from these three perspectives and to avoid ambiguity and duplication, the three perspectives are drawn together into one table (see Table 6), to define seven areas of validity that were considered to assess the quality of the research methodology used in this research.

#	Validity Type	Detailed Description	Source for detailed description
1	Design Validity	Descriptive validity: Accuracy of events, objects, behaviours and settings reported.	Zachariadis et al., 2013*:*

		Credibility: Results are believable from the participants of the research	
		Reliability: Demonstrating that the operations of a study, such as the data collection procedures, can be repeated with the same results. Mitigation against participant error, participant bias, research error and research bias.	Bryman and Bell, 2011; Saunders et al., 2012; Yin, 2013 Zachariadis et al., 2013
		Construct Validity (also referred to as measurement validity): Identification of correct operational measures for the concepts being studied. Construct validity presupposes that the measure is reliable and stable.	Bryman and Bell, 2011; Yin, 2013
2	Analytical Validity	Theoretical validity: Theoretical explanation developed fits the data.	Zachariadis et al., 2013)*:*
		Dependability: Research describes the changes in the research setting and its effects on the research approach of the study.	Bryman and Bell, 2011; Zachariadis et al., 2013
		Plausibility: Findings of the study fit the data from which they are derived.	Bryman and Bell, 2011; Zachariadis et al., 2013
		Objectivity: (the authors use the term confirmability but objectivity is considered a more accurate description): Has the investigator allowed his or her values to intrude into the research to a high degree.	Bryman and Bell, 2011
3	Inferential Validity	Interpretive validity: Interpretation of participants' views are accurate.	Zachariadis et al., 2013
		Confirmability: The results are confirmed by others.	Zachariadis et al., 2013

4	Internal Validity	Seeking to establish causal relationships, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships. Mitigation against the impact of specific events that may change participants perceptions during the research, the impact of testing on the behaviour and responses of participants, consistency of definitions and measurement instruments, the impact of participants withdrawing from the research, the impact of a change in participants views triggered by external elements outside the influence of the study, ambiguity about cause and effect Note that Yin (2013) argues that this criterion is only applicable for explanatory or causal studies and not for descriptive or exploratory studies.	Bryman and Bell, 2011; Saunders et al., 2012; Yin, 2013
5	External Validity	Defining the domain to which a study's findings can be generalised.	Bryman and Bell, 2011; Saunders et al., 2012; Yin, 2013
6	Replicability	Whether the results of the research can be repeated. Note that authors make a distinction between "reliability" and "replicability". Reliability relates to whether the results of the study are repeatable. Conversely, replicability is whether the research process and data collection can be replicated (even if the results turn out to be different).	Bryman and Bell, 2011
7	Ecological validity (Bryman and Bell, 2011)	Demonstrates that the findings from the study are applicable to people's every day, natural social setting. The criterion aims to make a distinction between those findings which may	Bryman and Bell, 2011

		be technically correct, but irrelevant for what happens in people's daily lives.	

Table 6 : Seven criteria used to assess research design quality (developed by the author)

The aim of the above table is to provide the seven criteria to assess the research methodology used in this research and the methodology's fit for the research questions set out. By considering quality from different perspectives, it is aimed to provide a more holistic assessment of the research quality. However, it is noted that even when drawing from just four authors, ambiguity over certain terms can cause confusion. For example, the terms reliability (Yin, 2013) and replicability (Bryman and Bell, 2011) could be considered synonyms, and arguably the two terms do overlap to some degree, but both are considered as each provides a subtly different focus.

5.7 Assessing the research methodology against the seven quality criteria defined

In this section, each of the seven quality criteria laid out in Table 6 is used to assess the research quality of this research. The aim of this section is not so much to demonstrate that every criterion is fully met in every sense, but rather to identify where gaps may have occurred, to provide the reader with transparency on possible research limitations.

In terms of the first criterion, design validity, this composes of four sub-components, descriptive validity, credibility, reliability and construct validity. The research addresses the first sub-component, descriptive validity, with the collection of detailed researcher notes and verification of the notes through triangulating of data collection using the three methods of observation, interviews and secondary data collection.

Credibility, the second sub-component, is achieved by providing meeting notes and short business presentations following the observation sessions, to ensure that data have been correctly interpreted.

Research reliability, the third sub-component, is recognised as a particular threat to research quality in this research and hence additional details are provided on this sub-component.

Research reliability can be impacted by participant error or bias, and by researcher error or bias. In this research, researcher bias is identified as a particular threat. Working as a researcher and an employee of the firm can create ambiguity, and care needed to be taken to ensure that the role of the researcher remained independent of the role as an employee. To do this, research questions that needed to be proved or disproved were avoided. This type of research question would pose more risks of researcher bias, as the researcher would have more pressure to obtain a proof. To avoid this, the research focused on exploratory theory development and it was already accepted at the outset of this research that the conclusion to the research may be that the theory developed does not work for the case study firm. With this, there was less pressure on the researcher to find a correct answer and thus, less likelihood of research bias.

Even with this considered, the risk of research bias when the researcher is also an employee of the organisation remains a high risk in this research. In particular, it is noted that the observations and comments provided by CasComp employees may have been influenced, even subconsciously, by actions or gestures from the researcher. Although the researcher attempted to create a clear mental division between acting as an employee in the CasComp and acting as a researcher in the CasComp, the mental change would not have been visible to other CasComp employees, and thus their behaviour could have been influenced by the researcher, either from behaviours displayed at the time that the researcher was carrying out observations, or even from other interactions with the researcher when the researcher was carrying out their normal activities as an employee and during the observation periods. Although these risks are noted, the risk of working as both an employee and a researcher also brings advantages, especially in terms of access to CasComp employees, but also in terms of understanding company and industry terminology, which an external researcher may misinterpret or overlook the significance of certain observations. It was felt that on balance, the advantages of access available to an employee of the organisation outweighed the potential risks and disadvantages of having a dual role of researcher and employee.

The risk of researcher error was also possible in this research, particularly if the researcher draws incorrect conclusions from the results and data collected. To counter this risk, a mixture of qualitative and quantitative methods was used. Qualitative data were sense checked with quantitative analysis, to provide a more objective assessment of the data. The risk of researcher error is particularly high when the researcher investigates a firm that is not known, as this creates a risk of misunderstanding internal methods or terminology used in the firm. In this case, this risk

was considerably lower as the researcher worked in the firm for five years prior to investigating it, and was also familiar with the industry terminology.

Participant error and participant bias also posed a risk to the research design validity. Participant error can occur when the questions asked by the researcher are unclear or ambiguous. This risk is mitigated in this research by following up after workshops and interviews with documentation that aimed to document the researchers understanding of what had been said. After each interview or workshop, the interviewee had the opportunity to correct or adjust any documents, before they were considered as data in this research. Participant bias was not considered a high risk in this research. Interviews and workshops were carried out in an open environment and all CasComp members were informed that anonymity would be protected in the results of this research. Although not considered a high risk, participant bias and error were mitigated by interviewing and observing a sample of different individuals, allowing the possibility to triangulate the different opinions.

The fourth sub-component of design validity is construct validity. Construct validity relates to the extent to which the research measures actually measure what they intend to measure. In this research, mainly qualitative data were collected, but this does pose questions for construct validity. No researcher can be in every meeting, nor can they capture every piece of datum in the meeting, especially when one considers that researchers can capture data not just on what is said, but also on the actions and expressions of social actors (Spradley, 1980). Hence, decisions needed to be made about which meetings to attend and what data to capture from those meetings, and equally about which employees to observe and interview. The risk of issues with construct validity was mitigated with the sampling approach defined in an earlier section of this chapter.

Moving on to the second of the seven quality criteria defined, analytical validity. Within analytical validity, four sub-criteria are considered relevant. Firstly, theoretical validity was considered with care taken to ensure that the ATBV theoretical conceptual framework developed was developed based on a strong theoretical foundation. Equal care was taken to ensure that the ATBV conceptual framework developed was aligned with the observational data collected in the CasComp. Secondly, dependability was an important consideration in the research, particularly as the data collection was carried out over an extensive time period. Over such a long period, it was inevitable that organisational changes would occur that could impact the research setting.

Consequently, any major event impacting the organisation was also noted and considered as part of the data collection process, and the potential impact on the research was considered. Plausibility, the third criteria, was mitigated against by regularly sharing the findings of the study with the CasComp team to align the findings with the data from which they were derived. Fourthly and lastly, objectivity was a key risk for this research, due to the position of the researcher within the CasComp. Due to the high risk of objectivity for this research, it is worthy of some detailed consideration.

Some authors argue that research can never be completely objective and value-free (Habermas, 1978), as even pure positivist research requires subjective decisions from the researcher about what data to collect, what statistical methods to apply and what conclusions can be drawn from the results. This said, objectivity should be aimed for particularly when the researcher works closely with the group being researched (in this case, the CasComp), as there is a danger that the researcher can become a supporter of the group being researched (Yin, 2013). To reduce this risk of subjectivity, textual analysis of departmental presentations, meeting notes and e-mail communications were used as supplementary data with the aim of objectively verifying the understanding of the data and also actively looking for data that contradicted any researcher ideas.

The third of the seven quality criteria, inferential validity relates to whether the data have been correctly interpreted in the view of the participants and whether the results can be confirmed by others. On the former, care was taken to validate the interpretation from the data, with meeting notes and presentations provided to the CasComp throughout the research, to ensure that data during workshops had been correctly interpreted. On the latter, Miles and Huberman (2014) consider that a key criterion for confirmability is the extent to which the researcher admits his or her own predispositions, indicating that the researcher must internally reflect and provide insight as to why decisions were made during the research. Shenton (2004) argues that triangulation is key to promoting confirmability, and as such triangulated has been applied throughout this research.

The fourth of the seven quality criteria, internal validity is particularly relevant for explanatory research (Yin, 2003). As such, the use of the ATBV conceptual framework and the theoretical foundations upon which the conceptual framework is built is considered key to ensuring internal validity. The ATBV conceptual framework laid out the expected causal relationships between

central management attitudes, general management time allocation and firm growth. Moreover, use of the ATBV framework ensured a consistency of definitions and instruments with which to frame and analyse the data.

The fifth of the seven criteria, external validity relates to whether the research findings can be generalised to other relevant settings or groups. One of the principal critiques of using a single case study research methodology, as is applied in this research, is that such a methodology assumes a lack of external validity. It is for this reason that the focus on this research is not concentrated on the investigation of the single case study *per se*, but rather, the investigation is focused on investigating the applicability of the ATBV conceptual framework developed on the theoretical foundations of the theory of the growth of the firm (Penrose, 1959). The ATBV conceptual framework is designed so that it can be applied to any type of firm (not just the CasComp) and also used to investigate any type of productive opportunity (not just PSS productization) that a firm may consider. As such, this research aims to achieve a high level of generalisability from a theoretical perspective.

Replicability, the sixth criteria refers to whether another researcher could apply the same research method in a different firm (Bryman and Bell, 2011). Replicability for this was facilitated by detailing out the research design and data collection methods as per the previous sections. Also, the replicability of the design is enhanced with the use of the ATBV conceptual framework and the use of the DISC score analysis method, which can be applied by other researchers, in other firms and industries.

Finally, the seventh criteria, ecological validity is relevant for this research in that, as laid out in the research philosophy, it is not the intention of this investigation to develop grand theories (Makadok et al., 2018), but rather to develop and test theories that can be used to gain a deeper understanding of how firms behave, and the impact that attitudes and time allocation have on both the behaviour of the firm and eventually on the overall performance of the firm.

Table 7 summarises the quality criteria used, the level of risk identified, and the mitigations employed to minimise the risk related to those quality criteria.

#	Quality criteria considered	Level of risk of not meeting the criteria defined	Mitigations used
1	Design validity (credibility, reliability and construct validity)	High	- Triangulating of data collection using observation, interviews and secondary data collection. - Regular review of notes, interviews and findings with CasComp team before inclusion into the data set - Avoidance of use of research questions that need to be proven or proven - Separation of the role as a researcher and as an employee of CasComp - Use of a sampling method to obtain different views and perspectives - Research carried out in an open, transparent environment - Anonymising of any data collected at CasComp
2	Analytical validity	High	- Data collected making use of established theories (theory of the growth of the firm, and the theory of planned behaviour) - Data collected over a long-time frame to reduce risk of distortion to data due to short term changes - Use of textual analysis on secondary data to confirm and contradict data from primary data
3	Inferential validity	Medium	- Sharing and regular review of data with CasComp team to check for understanding and correct interpretation

			- Triangulation of data to look for contradictions
4	Internal validity	Medium	- Use of the ATBV conceptual framework to frame the causal relationships between the main components under investigation and to ensure clarity of definitions under investigation
5	External validity	High	- Use of the ATBV conceptual framework to facilitate the possibility of replicating the research methodology with other firms or with other productive opportunities
6	Replicability	Medium	- High level of detail provided on the research methodology used - Development of DISC score which can be replicated in other research
7	Ecological validity	Medium	- Application of the ATBV conceptual framework in a real-life case study to understand a real-life firm-level planned strategic change

Table 7 : The seven quality criteria used, the level of risk identified and applied mitigations

As well as considering the quality of the research methodology used in this research, it is equally important to review the ethical considerations of this research. This is discussed in the following section.

5.8 Ethical considerations

The idea that ethical issues can be dealt with by the individual researcher without recourse to guidelines or a framework is problematic because it assumes that researchers are aware of what constitutes an ethical issue and also that they are prepared to regulate their own behaviour in accordance with what they believe to be right in a given situation (Collins, 2000 sourced from Bryman and Bell 2003).

In order to ensure that this research upholds a high standard of ethical considerations and avoids the above issue, three ethical frameworks were considered and adopted. The principal framework is from the ESRC (The Economic and Social Research Council), which provides 6 guiding principles for ethical research.

1. Research participants should take part voluntarily, free from any coercion or undue influence, and their rights, dignity and (when possible) autonomy should be respected and appropriately protected.

2. Research should be worthwhile and provide value that outweighs any risk or harm. Researchers should aim to maximise the benefit of the research and minimise potential risk of harm to participants and researchers. All potential risk and harm should be mitigated by robust precautions.

3. Research staff and participants should be given appropriate information about the purpose, methods and intended uses of the research, what their participation in the research entails and what risks and benefits, if any, are involved.

4. Individual research participant and group preferences regarding anonymity should be respected and participant requirements concerning the confidential nature of information and personal data should be respected.

5. Research should be designed, reviewed and undertaken to ensure recognised standards of integrity are met, and quality and transparency are assured.

6. The independence of research should be clear, and any conflicts of interest or partiality should be explicit.

(ESRC, 2015)

In addition to these guiding principles, CasComp's code of ethics was also adhered to, in particular in terms of the importance of retaining the company's proprietary information and intellectual property.

Lastly, the Buckingham University code of ethics, which stresses the importance of honesty and openness (University of Buckingham, 2016) was also adhered to.

Overall, the principal ethical consideration is related to the CasComp information and the individuals within the CasComp who contribute to the research.

In terms of the CasComp information, as this research will be publicly available, care was taken not to reveal sensitive commercial information that could harm the firm or its competitive situation. If in doubt, information was checked with the CasComp before its inclusion in this research.

In terms of the people involved in the research, care was taken to ensure the name of any people observed during this research was anonymised in the findings section. Also, any individuals who were formally interviewed were asked to sign an informed consent declaration before the data were used in this research.

5.9 Research methodology limitations

Any and all research design has limitations. In fact, each design decision made related to the research philosophy, strategy and data collection method generates a limitation in some way. Although many of the limitations are already described and mitigated in earlier sections, the aim of this section is to draw attention to the major limitations that are recognised and should be considered when drawing conclusions from these research findings. Three principal limitations are highlighted:

The principal limitation identified is the fact that the researcher carrying out the data collection is also an employee of the firm under investigation. This creates a high potential for researcher bias (Yin 2009), even unconscious. To reduce this potential for bias as much as possible, textual analysis of departmental presentations, meeting notes and e-mail communications were used as supplementary data, which were objectively analysed to identify if the objective data provides any contradictory findings from the researcher interpreted data.

The second limitation is that of only using one case study firm. It is noted that this is a major limitation in that it cannot be demonstrated that the findings are generalizable. To ensure the findings from this research are generalizable and not context-specific for the one firm, this research places a heavy focus on theory development. As such, the aim of the case study research method is not so much to increase knowledge about the specific case of the CasComp (not very generalizable knowledge), but rather to use the case study as a means to develop and increase knowledge about the theory of the growth of the firm (Penrose, 1959), a much more generalizable research phenomenon.

Finally, to investigate the CasComp, a firm of 13,000 people and investigated over a research period of two years, it is evident that not all employees could be observed and not all firm data could be captured. There was a risk that the selection of employees observed would not represent the full view of the firm. However, with the use of the sampling method detailed in the research methodology and by interviewing and observing the central management team over a prolonged period, this risk is minimised. Equally, although there was a risk that important company information was overlooked or not considered in this research, the systematic secondary data research method used to collect company information aimed to minimise this risk.

With the research methodology now full laid out, it is now possible to provide the data collected and analysed to fully address the research questions set out in this research.

6 Applying and testing the ATBV conceptual framework

6.1 Chapter introduction

Earlier chapters of this research have laid out the theoretical foundations, set the contextual boundaries for this research and sought to bring together existing literature that is deemed relevant to address the research questions set out. The previous chapter has laid out the research methodology to address the research questions in this research. The central purpose of this chapter is thus to provide the data and analysis discovered from the application of this selected research methodology and ultimately provide the data that are later used to address the research questions set out.

Before presenting the data collected, it is deemed necessary to first recap, at a high level, the information already provided related to the research questions set out in this research.

In relation to RQ1, it has been argued thus far that the theory of the growth of the firm (Penrose, 1959) explains the behaviour of the firm that seeks to grow through a strong focus on the understanding of the availability of management capacity, restated as availability of management time. This assumption related to the importance of management time is incorporated into the new ATBV conceptual framework.

In developing the ATBV conceptual framework from the theory of the growth of the firm (Penrose, 1959), several gaps in the theory are identified. In particular, it is noted that Penrose (1959) does not provide a means to understand the influence of central managers and their attitudes in setting the direction of the firm. To overcome this, elements from the theory of the planned behaviour (Ajzen, 1991) are added to the ATBV conceptual framework with the aim of testing whether a deeper insight and understanding of how the attitudes and behaviour of key managers in the firm (central managers) influence the overall behaviour of the firm. Thus, this research aims to understand how time allocation and attitudes of managers influence the overall behaviour of a firm that seeks to grow, a question that is specified in RQ2.

To answer RQ2 and test the new ATBV framework, it has been elected to apply the framework in the contextual field of the logistics service industry, and specifically to test the ATBV framework´s

suitability to improve understanding as to why a logistics service provider would seek to move away from its core offering of providing logistics services to pursue a new productive opportunity of a PSS business model (as outlined in chapter 3).

It thus remains for this research to provide the data collected and test whether the newly developed ATBV conceptual framework can improve understanding of firm-level behaviour and performance and ultimately be used to answer RQ2

The first section of this chapter begins with an introduction to the CasComp, the single case study firm that is used to test the ATBV framework. Such an approach is in line with the ideas of Penrose (1959) who argues that an understanding of any firm must begin with an understanding of the firm itself, as opposed to the industry or any other external environments in which the firm operates.

Following the brief introduction to the CasComp, the remainder of the chapter lays out the data discovered for this research, provided through the lens of the ATBV conceptual framework.

6.2 Introduction to CasComp

CasComp is a large LSP firm, one of the top 15 in the world. It is an established firm that has been in business for over a century. The firm has grown on the back of providing air, ocean and logistics services. Today (2018), the CasComp has offices all over the world and employs more than 14,000 people.

At the start of 2012, the CasComp was a pure service provider, offering air, ocean and logistics services and had no manufacturing capabilities (and thus was not providing a PSS). Between 2012 and 2017, CasComp pursued a strategy of PSS productization and at the time of writing (2018), continues to do so. Although the data presented here were collected between January 2016 and December 2017 (a 2-year period), the aim of the research is to understand the full 5-year period between 2012 and 2017 with a view to understanding the long-term behaviour of the CasComp as it pursued a PSS productization strategy, investigated through the lens of the ATBV conceptual framework.

6.3 Introduction to data collected

Due to the large volume of data collected for this research, it is deemed necessary to apply the ATBV framework to provide the relevant data in a series of subsections linked to the mechanisms in the ATBV framework. For ease of reference, the ATBV framework developed in earlier chapters is repeated here.

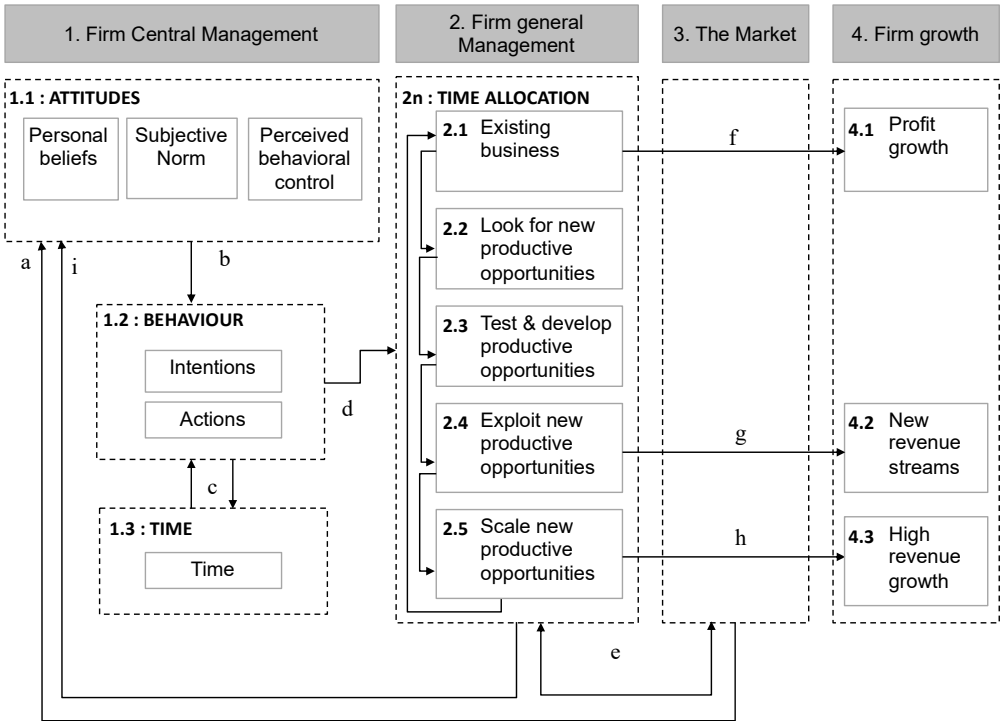


Figure 15 : ATBV conceptual framework (copy from early chapter, provided here for ease of reference only)

In the remaining subsections of this chapter, data are provided using the relevant mechanisms from the ATBV framework. Table 8 provides an outline of the structure of the data presented in the remainder of this chapter. The first column of Table 8 provides a mechanism or a number of mechanisms from the ATBV framework. The second column indicates what data are collected and presented, and the third column indicates the relevant sub-section of this chapter in which the data are presented.

Relevant mechanisms from the ATBV conceptual framework	Data provided related to:	Data provided in sub-section of this chapter
1. Firm central management 2. Firm general management	Differences observed between central management and general management	6.4
1.3 Time availability of central managers	Availability of central management time as the first constraint to firms looking for new productive opportunities.	6.5
(a) information from the firm (i) information from the market 1.1 firm central management attitudes	The development of firm central management attitudes based on information from the firm and the market.	6.6
1.1 Attitudes of central managers 1.2 Central management behaviours 1.3 Central management time allocation	Ways in which the attitudes of central managers influence central manager behaviours and central manager time allocation	6.7
1.1. Attitudes of central managers 1.2. Central management behaviours 1.3. Central management time allocation	Ways in which the beliefs and attitudes of central managers about specific productive opportunities (in this case in terms of the development of pursuing a PSS productization strategy as a new productive opportunity) influence central management behaviour and actions towards specific productive opportunities.	6.8
1.2 Central management intentions and actions	Ways in which firm central management behaviour differs in terms of intentions and actions.	6.9
1.2 central management behaviours	Ways in which central management behaviour influences firm general management time allocation	6.10

2n. Firm general management time allocation (d) Influence of 1.2 on 2n		
3. The market 2n general management time allocation (e) influence of 3 on 2n	Ways in which the market influences general management time allocation	6.11
The impact of spending time on the existing business (2.1) on profit growth (4.1) The impact of spending time exploiting new productive opportunities (2.4) on creating new revenue streams (4.2) The impact of spending time scaling new productive opportunities (2.5) on the creation of high revenue growth (4.3)	Ways in which different general management time allocation results in different firm-level performance outputs	6.12
All elements of the ATBV conceptual framework	The levels of interactivity between the different mechanisms of the ATBV conceptual framework.	6.13

Table 8 : Sub-sections of ATBV conceptual framework used to present data collected

The remainder of the chapter provides the data under the sub-heading of each of the rows in the table above.

6.4 The differences between firm central management firm general management

The ATBV framework proposes that there is a need to make a distinction between central and general management. For the CasComp, a formal group, known as the “Executive Board” of the firm were identified as the central management team. This Executive Board included the Chief

Executive Officer, Chief Financial Officer, Chief Commercial Officer, Chief Legal Officer, Chief Human Resources Officer and Chief Information Officer. As such, the central management team composed of six managers and were a relatively small group of managers within the firm. In contrast, the CasComp had a large number of general managers (more than 2000), most of which had both a geographical responsibility and a product responsibility. Typically, these managers worked at either a country level or at a Business Unit level. Thus, it is noted that the CasComp general managers had varying degrees of responsibility and seniority. But, for the ATBV conceptual framework, the only distinction made is between those managers who form part of the central management team and those that do not.

Within the CasComp, it was observed that there was a clear distinction between central management and general management, and it was also observed that the Executive Board did match the definition of the Central Management group as defined in the ATBV conceptual framework. As one central manager explained:

> *"it is the responsibility of the Executive Board to set the firm strategy and monitor progress of strategy execution".*

This view that only the Executive Board could set firm-level strategy was found across the CasComp, with another general manager, when referring to a new project that the general manager was aiming to launch, stating:

> *"Unless we get the nod from the Executive Board on this, no one will let us do anything".*

These statements support the notion that there is one group, and only one group of managers within the CasComp who had the authority to set firm-level strategy, the "central managers" to use the terminology from the ATBV framework, or the Executive management to use the terminology used in the CasComp.

It was also found that it was the central management group, rather than any one individual (such as the CEO) who had the final decision on certain firm-level decisions. For example, when considering the purchase of a 3D Printing machine (the purchase of which would allow the CasComp to start production and thus initiate a PSS), the CEO stated:

"I do want to do this, but it's not all down to me, I need to check what this could mean from an insurance and contracting perspective".

This demonstrates that the CEO was not able to make the final firm-level decision in isolation, but had to consult other members of the central management group, in this case with the Chief Legal Officer to determine if the CasComp had the necessary legal rights, insurance and permits to operate the 3D Printing machine.

Although these data suggest that certain decision making was not with any one individual (even the CEO of the Cascomp), other observations demonstrate differences between the decision rights of central managers and general managers. On discussing whether resources were available to be assigned to a particular 3D printing project, one general manager commented:

"We will need to do a business case and get Executive Board approval before we can get someone working on this"

Conversely, when the same discussion took place with members of the central management group, one general manager asked if resources could be made available for the project, the central manager responded:

"Of course we can assign resources to this, that's essentially our job. But, we don't have unlimited resources, so if we want to assign resources to this, we need to stop doing something else, that's what we need to decide"

Distinctions between central managers and general managers time autonomy were also observed. On discussing whether to organise a sales workshop related to internally promoting productization services, one general manager stated:

"We would need to spend time organising this and making sure we have the buy-in from the executive board. Unless the executive board give their approval, we will never get the interest of the country sales team and we will just be wasting our time"

This can be compared with a similar discussion with a central manager about organising a different, but similar internal sales event:

"If we need salespeople there, we just tell them they have to be there"

This example shows that whereas general managers did not have the ability or power to dictate how other employees in the CasComp should be there time (in this case, at an internal sales workshop), the central manager had the ability and power to dictate how employees in the CasComp should spend their time.

The observations from within the CasComp found that distinctions could be made between the central management and general management group in six key areas that were relevant to the ATBV conceptual framework. The different characteristics observed between central managers and general managers are provided in Table 9.

#	Areas of differences	Characteristics of central managers within the CasComp	Characteristics of general managers within the CasComp
1	Ability to set firm-level strategy	Had the power to decide whether the pursuit of a new productive opportunity was accepted as a firm-level strategy	Worked on developing new ideas or pursuing new productive opportunities, but needed approval from central management that pursuit of the productive opportunity was accepted as a firm-level strategy
2	Position within the firm	Had a position on a central firm-level board that had the power to start or stop resources working on certain productive opportunities.	May have joined some board meetings in which firm-level strategy was decided, but did not have final decision on which productive opportunities the firm should pursue
3	Ability to change the firm-level structure	Had the power to change the overall organisational structure of the firm	Did not have the power to change the organisational structure of the firm

4	Level of time autonomy	Had high levels of time autonomy	Allocation of time highly influenced by other central or general managers in the firm.
5	Importance of attitude towards the development of the firm strategy	Their attitude towards the pursuit of a productive opportunity could directly result in the pursuit of a new productive opportunity being stopped or could result in additional management time being allocated to the pursuit of the opportunity	Their main focus is on influencing the attitudes of central managers to get the new productive opportunity accepted as a firm-level strategy and/or to obtain more management time allocation and resource.
6	Level of responsibility for the firm performance	Responsible for the performance of the firm at a firm-level	Responsible for a specific division or geography within the firm

Table 9 : Differences observed between firm central managers and firm general managers within the CasComp

Thus, the data highlight the importance of separating central and general managers within the ATBV conceptual framework as each management group performed different roles within the CasComp. Moreover, the segmentation of the two management groups allows researchers to investigate the two groups independently and in different ways. Specifically, for this research it allowed the possibility to isolate and investigate the central management group, both in terms of their time allocation constraints and their attitudes towards the development of certain productive opportunities that the firm could pursue.

It was observed that the availability of central management time in particular was the first constraint to the CasComp pursuing new productive opportunities. This is discussed in more detail in the following section.

6.5 Availability of central management time as the first constraint to pursuing new productive opportunities

The data provided in this sub-section are particularly relevant for RQ2 as the data helped to understand and explain why a firm would seek to look for new productive opportunities outside of its core business. A statement by one central manager suggested that the CasComp central managers perceived that at the time (Feb, 2016) that CasComp was not ready to grow. As one central manager stated

> *"…..before we start introducing new ideas, we need to make to make sure that our own house is in order and that we have the foundations in place to grow…we don´t have them yet".*

Such a statement suggests that at that time (Feb 2016), central management in the CasComp believed they needed to spend time on the existing business, and not spend time looking for new productive opportunities. It was observed at that time (Feb 2016) that very little time was being spent by the central management on considering new productive opportunities, reflected in the comments from one CasComp general manager

> *"the executive board is busy running the day to day business, we don´t have the time to spend discussing potential future industry changes and disruptions that might not even happen"*

Such a statement does highlight the Penrose effect (Tan and Mahoney, 2005) in action, which states that managers need to trade-off how much time they dedicate to looking for new productive opportunities and how much to spend on running the existing business. Although the CasComp recognised the importance of both developing new productive opportunities and exploiting existing capabilities, as highlighted by one CasComp general manager:

> *"There are two sides to our business. One side is about investing in and developing new business platforms, and the other side is about selling and exploiting that platform. As a company, we need to spend time doing both"*

The observations of the CasComp central managers suggested that during the early periods of the data collection nearly all central management time was spent running the existing business. It is thus logical to conclude that if no central management time was available to consider the pursuit of developing new productive opportunities at the firm-level, that no new productive opportunities (such as PSS) could be accepted by central managers at a firm-level.

The question that can be asked then, is what changed at the CasComp? What attitude of central management changed that convinced central management to dedicate time to looking for new productive opportunities such as the development of a PSS? Data related to this question are provided in the following section.

6.6 The development of firm central management attitudes based on information from the firm and from the market.

The ATBV conceptual framework indicates that central managers allocate their time (1.2) based on attitudes developed (1.1) using information from the market (a) and information about the firm itself (i). The previous section indicated that the CasComp central managers did not perceive that the firm was ready to grow, a clear attitude (1.2) about the CasComp itself. However, it was observed that the main discussion point for central managers when deciding the future direction of the firm was not about the state of the firm itself, but rather about their view of the market in which the firm operated. In other words, information about the market (a) was considered by central managers as more relevant than information about the firm itself (i). This was deduced from the amount of time central managers were observed discussing either the firm or the market.

The data and observations within the CasComp suggest that Penrose´s (1959) proposition that it is the image of the market by central managers that is a major influence on central management behaviours. Six themes were regularly discussed and considered by the CasComp central managers in relation to their individual image of the existing core logistics market, namely:

a) The belief as to whether the CasComp could grow within its existing core logistics market
b) The belief in the CasComp´s ability to remain competitive *vis-à-vis* their existing competitors in the existing logistics market

c) The belief that new strong entrants would enter into the core logistics market of the CasComp at some point in the future
d) The belief as to whether the core logistics market would continue to grow or decline
e) The belief as to whether the core logistics market would provide potential for increased profit margins
f) The belief as to whether the core logistics market would provide potential for nominal profit increases

The data related to each of these themes discussed by the central managers at the CasComp are provided in the following sections. It must be noted however that the individual beliefs of the central managers towards these six themes were often different and even contradictory. This is demonstrated with the first example, where three different central managers were asked about (a) their belief as to whether the CasComp could grow within its existing core logistics market.

One central manager stated:

> *"The [logistics] industry is still very fragmented, and there are still lots of opportunities for growth through acquisitions and consolidations"*

Another central manager stated:

> *"E-commerce is creating a huge increase in the need for logistics services, as now smaller orders are being shipped and transported across the world, this creates a huge opportunity for logistics companies"*

In contrast, another central manager in the CasComp argued:

> *"Logistics is already a low-margin commoditised industry and it is likely to get worse as capacity and supply is increasing at a faster rate than demand. For the CasComp to survive and achieve higher margins, we need to look outside of our core logistics market"*

Such comments indicate that there was no one single “image” about the market, each individual central manager had their own “image” or belief about the market, which one can assume would influence the personal actions and decisions of each manager.

In terms of central management’s belief related to (b) the CasComp´s ability to remain competitive within the logistics market, CasComp managers agreed that there was a high level of competition in the logistics market. CasComp managers often referred to a key, larger competitor, that it was perceived had stronger buying power than CasComp and a larger sales force, which was making it difficult for CasComp to win new business and grow. One CasComp manager explained:

> *“We are simply not big enough to compete with [competitor name], they have hundreds of salespeople. We (CasComp) only have a handful of salespeople in each country, and because [competitor name] sells more freight, they have more buying power with the carriers, so they can buy more cheaply than we can, and can therefore offer cheaper prices than us (CasComp)”*

But, Cascomp managers also pointed out that the logistics industry also contained many small logistics providers that CasComp should, in theory, be able to win business from easily, or even acquire to grow. As one CasComp manager explained:

> *“Even the market leader has less than 5% of the total market, and there are thousands of small, specialist logistics companies around the world that we [CasComp] could buy or win business from”*

This again demonstrates that different central managers within the firm had very different images about the level of competition within the same industry. Such views support Penrose´s proposition that it is the image of the market, and not any objective, discernible market information that influences management decisions.

Several CasComp managers also mentioned their belief related to (c), the threat of other competitors (particularly, Amazon) entering the logistics market and the additional competitive pressures that this could put on the CasComp in their core industry. As one CasComp general manager explained:

"Amazon are already competing with us, they have more warehouses and move more international freight than we do. It is only a matter of time before they start offering their excess capacity to our customers, and Amazon operate at such low margins, they will be able to undercut our prices"

Thus, the perception and beliefs of CasComp managers about the level of competition within the existing core logistics market were mixed; on one side, most managers pointed to strong competitors that held back the CasComp from growing and the threat of even stronger competitors entering the market in the future, but on the other side, CasComp managers also recognised that the logistics market was highly fragmented, with a large number of small players that the CasComp should be able to dominate. Again, this demonstrates a mixture of different beliefs and images about the market amongst central managers within the CasComp, rather than any one single firm-level belief.

The beliefs related to (d), the expected future growth of the overall logistics market was also a key consideration and point of discussion for the CasComp managers. It was observed that there were many different beliefs amongst CasComp managers on the expected future growth of the logistics market. For the CasComp managers trying to forecast whether the logistics market would grow or decline in the future proved to be very difficult, as one central manager stated:

"There are only two types of forecasts, lucky ones and bad ones"

Due to the difficulty of forecasting whether the core logistics market was likely to grow or decline in the future, for this discussion, the CasComp central managers did look at published historical information about the growth of the logistics market. Interestingly, the CasComp central managers did not make use of market research reports but instead sought to find and use government economic data that they could use to understand trends in the market. One figure tracked and used by the CasComp central management team to identify trends and the overall rate of growth of the logistics industry was the value of internationally exported products. A key underlying assumption of using this figure was that the size of the market for logistics services would grow and decline in line with the value of international exports of products. The value of internationally exported products was used as it was readily available and published for free by the Organisation for Economic Co-operation and Development (OECD). Also, unlike many other published macro-economic trade statistics, the figures excluded trade in services and only included trade in

physical goods. This makes the statistics most relevant for LSPs whose business relies on moving physical goods.

Figures provided by the OECD (2017) show the value of physical goods exported from 46 leading countries. This gives an indication of the rate of growth of logistics services over the last 20 years. The values of exported goods statistics from the OECD are provided in Figure 16.

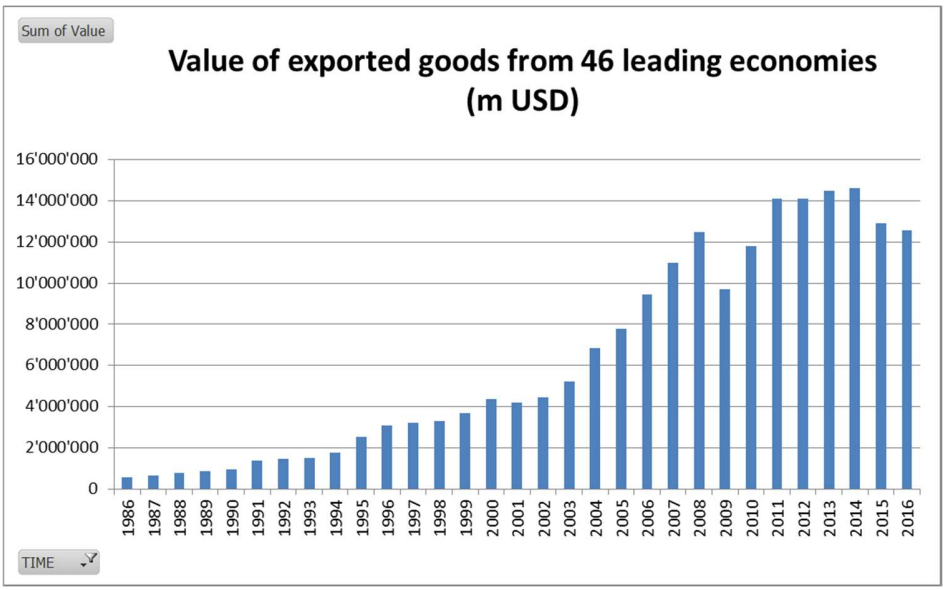


Figure 16 : Value of exported goods from 46 leading economies (m USD) 1996-2016 (OECD, 2017)

From this analysis, it was concluded by the CasComp that between 1996 and 2008, the logistics market had grown consistently. The market crash in 2009 resulted in a large decrease in the size of the logistics market (a check of the revenues of the largest 15 3PLs in 2009 also confirms this exceptional decrease), but the market had rebounded and grown in 2010 and 2011.

Of particular note is that between 2011 and 2016, using this measure, the total market had been flat or declining. This figure was considered by the central managers as an indication that the logistics market may be stabilising, and the days of rapid continued growth may be coming to an end. In fact, one CasComp central manager noted when referring to the OECD figures:

"Over the last 20 years, LSPs have had it easy. Their business has grown on the back of globalisation and the propensity of shippers to outsource their logistics activities. Historically, LSPs did not need to innovate or look for new markets, they just needed to turn up and they would grow. Now, the (logistics) market is flattening or even declining, so LSPs need to look beyond their traditional service offerings"

Thus, although there were differences of opinion amongst central managers about the likely future likely growth in the core logistics market, the stabilisation and decline provided in the OECD figures were used by some central managers to make their point that the CasComp needed to look beyond the core logistics market.

For such central managers the expected growth, or rather the lack of expected growth available within the core logistics market was highlighted as a key argument to encourage other CasComp central managers to consider looking for new productive opportunities outside of the core logistics market.

Linked to the discussions on whether the core logistics market would continue to grow as a whole, the (e) profit potential available for the Cascomp from the existing and future logistics market was also a key consideration for the CasComp central managers when deciding whether to explore new productive opportunities outside of the core logistics market. In other words, it was not just about whether CasComp managers believed the core logistics market would grow or not, but rather whether they believed the CasComp could grow profit in the future. Such a finding that the potential for revenue and the potential for profit growth were considered as separate beliefs, contradicts the ideas of Penrose (1959) who argued that revenue and profit were one and the same thing. In fact, for one CasComp central manger, a distinction was made between the need to grow revenue, profit and cash. As the CasComp manager pithily explained:

"Revenue is for vanity, profit is for sanity, cash is for reality".

Such a statement demonstrates that for the CasComp central manager, it was not only a case of considering the size of the logistics market in terms of revenue but also what profit and cash generation potential existed from the existing core logistics market. The distinction between

revenue and profit focus was also stressed during a discussion about the future profit margin potential available in the core logistics market. One CasComp manager stated:

> *"The logistics industry is a low margin business, 1-2% margins are the norm, we should be avoiding low margin business and aiming to get into areas where we can earn margins of more than 10%"*

Such an argument was used by certain central managers as a rationale for the CasComp to explore new higher-margin productive opportunities outside of the core logistics market.

Another important nuance found was the different views on the importance of profit margin. Some CasComp managers placed a high importance on achieving a high profit margin, and others were less interested in a high profit margin, and more interested in the (f) absolute nominal value of the profit that could be achieved in the core logistics market.

Specifically, one CasComp manager pointed to Amazon's performance as an example of a firm that has been very successful at delivering a large nominal profit, but always with very low profit margin, the CasComp manager stated

> *"margins are not that important, look at Amazon, they earn a fortune by taking a small margin on huge revenues"*

This Amazon example was highlighted as an argument against looking for productive opportunities only with high margin potential and used to argue that the focus should be on looking for productive opportunities with high nominal profit potential, regardless of whether it was achieved at high or low profit margins.

The previous paragraphs have provided the data related to the CasComp managers´ "image" or beliefs about the logistics market, represented in the ATBV framework by flow "a" into mechanism 1.1. The data have shown how CasComp managers considered the size of the market, the level of competition, the expected future growth of the market, the profit margin potential and the nominal profit potential. All of these were factors considered when reviewing whether to maintain the CasComps current course and remain focused on the core logistics market or explore new productive opportunities outside of it.

As the CasComp did decide to look for new productive opportunities outside of the core logistics market and pursue a PSS productization strategy, the data related to this decision to pursue a new productive opportunity are provided in the following section.

6.7 Ways in which the beliefs of central managers influenced central manager behaviours and central manager time allocation

The data in the previous section relate to the CasComp central managers´ attitudes and beliefs about the existing core logistics market. The data indicate that it is not so much that firms have different images or beliefs about the market, but rather that individuals within the firm have different images of the market, and that these beliefs are frequently different or even contradictory.

However, as outlined in the ATBV framework, it is proposed that these central management beliefs and attitudes (1.1) drive behaviours (1.2) from Central Managers and ultimately the behaviour and performance of the firm. However, according to Penrose (1959) and in line with the ATBV framework, even if the firm central managers believe that the firm should change course and pursue a new productive opportunity, a key constraint to be considered is the availability of central management time (1.3) to assess potential new productive opportunities.

The data observed within the CasComp support this proposition from Penrose (1959). It was found that the availability of central management time was the initial constraint to CasComp pursuing new productive opportunities. Thus, this section provides data related to the availability of central management time and how the balance of central management time changed from a full focus on the existing core logistics business to an increasing amount of central management time exploring new productive opportunities.

Although it has been noted that the Central Managers in the CasComp were responsible for setting firm-level strategy, the Central Managers (in the role as the Executive committee) were also ultimately responsible for the running of the day to day business. As one central manager commented:

"The success of the CasComp is built on the fact that we have consistent operational processes in every Business Unit across the world, so the role of the Executive Committee to make sure that we maintain this global consistency – if every Business Unit starts to do their own thing, the company would quickly turn into chaos"

Such an observation is provided to highlight that for the CasComp central managers, maintaining consistency for the firm was a high priority. As such, this quote highlights that the CasComp did see a paradox between, on one hand, ensuring consistency, focus and execution of running the existing core logistics business, and on the other hand, introducing new ideas and innovation into this business. This paradox aligns with Penrose (1959) proposal that firms seek to find a balance between two different types of management activities, on one hand, the management services that manage and administer the day to day business, and on the other hand, entrepreneurial services which seek to identify and introduce new ideas into the firm.

Observations within the CasComp highlighted the particular difficulty for CasComp to manage this paradox. One central manager explained:

"We are a network business where we help customers to move products from one location to another, we need all countries and business units to work together and help each other to make the business work"

Such a statement highlights the difficulty of introducing new ideas into a network type business, such as those run by LSP firms. As the statement suggests, all countries and business units needed to work together to run the existing business, so therefore introducing a new productive opportunity into one country or business unit, without introducing it across the whole network can be complex for LSP firms. As such, the decision on whether to introduce a new idea into the firm did require significant management time and consideration.

However, unless approved by the executive board, no new idea or productive opportunity could be officially introduced into the CasComp as a firm-level strategy. It was frequently the case that the central managers did not have time to review all business cases and new ideas, as one central manager explained:

"we don´t even have time to review and discuss in detail how the existing business is running, never mind trying to squeeze in more items on the agenda to discuss"

Recognising this lack of central management time to consider new productive opportunities, the CasComp CEO created a new, separate, quarterly review meeting, referred to as an "innovation board". The aim of the creation of this board was to separate discussions about running the existing business (this continued to be discussed in the executive board) and discussions about considering new productive opportunities for the CasComp. This provides an example of how the CasComp begin to allocate specific time for central managers to provide entrepreneurial management services to the firm, as opposed to spending all central management time on administrative management services.

The new innovation board was fixed for 2 full days each quarter, with the explicit purpose of creating time for the central management team to look for new revenue streams to grow the business, in other words, identify new productive opportunities. Essentially, this ensured that a number of central management hours were spent formally considering new productive opportunities outside of the core logistics market.

It was observed that once the CEO created time to look for new productive opportunity with the creation of the Innovation board, the CasComp central managers were quickly inundated with new ideas. The CasComp launched an internal communication that encouraged all CasComp employees to contribute ideas for new productive opportunities (CasComp used the term "innovations") that could then be discussed by the CasComp´s central management at the Innovation Board. More than 120 ideas were received from CasComp employees within 3 months.

Such data illustrate Penrose´s (1959) argument that the first constraint to growth is the availability of central management time to consider new productive opportunities and, once this is resolved (in the CasComp this was resolved by creating the new innovation board), the next constraint is the availability of entrepreneurial services, or in other words, the identification of potential new productive opportunities for the firm. For the CasComp, there was no shortage of ideas, in fact, the large volume of ideas now created a new constraint at the CasComp, in that central managers did not have time to review or pursue all of them. As one central manager explained

"There is no doubt that there are lots of very good ideas and innovations that we could pursue, and just because we decide not to pursue one idea does not mean that it is a bad area, but rather that we can´t do them all"

Such a quote does suggest that Penrose´s (1959) argument that availability of central management is the key constraint to firm growth, but it also highlights that central management time can be constrained in different ways; before the creation of the innovation board, central management time was constrained as all central management time was focused on the existing business. After the creation of the innovation board, when central management time was made available to look at new productive opportunities, central management time remained the constraint, but now the floodgate to new ideas was opened, and there were more productive opportunities available to review than CasComp central management had time to realistically consider. This indicates that the constraint on central management time remained but the reason for the constraint changed.

It is also worth highlighting that the CasComp did not see access to capital and funds as a constraint to growth. When discussing whether funds could be made available for the new productive opportunities that were being considered, one central manager stated

"if we have a good opportunity that we think is future proof and good for the long-term success of the business, then we have access to capital from the markets. We don´t need to worry about that"

Although the availability of funds may be a situation specific to the CasComp, this statement does highlight that for the CasComp, access to funds and capital was not seen as a constraint, a sentiment that aligns with Penrose´s (1959) views that it is management availability not access to funds that constrains firm growth.

The quotes in this section have served to demonstrate the relevance of the theory of the growth of the firm (Penrose, 1959), in that the quotes reveal the importance of central management time as a constraint to firms considering new productive opportunities that can be adopted as a firm-level strategy.

It is not the intention of this research to review all of the different productive opportunities available to CasComp or considered by the CasComp central managers. Instead, as per the contextual boundaries defined in chapter 4 of this research, the aim is to focus on understanding in depth how central managers at the CasComp considered one particular type of new productive opportunity, that of developing a PSS business model. Moreover, the aim is to seek to understand how the ATBV framework can be used to investigate how the particular productive opportunity of PSS that offered the potential for the CasComp to move away from its core logistics offering, was assessed and considered by CasComp central managers. Data related to the attitudes of central managers towards the development of a PSS strategy are provided in the next sections.

6.8 Firm central management attitudes towards considering a PSS productization strategy.

This section explores in more detail how central management beliefs about a specific productive opportunity, in this case, the development of a PSS productization strategy, came to influence firm-level behaviour.

To demonstrate how beliefs and attitudes towards certain productive opportunities developed and evolved over time at the CasComp, two sets of data are provided in this section. The data are presented using the DISC score which is explained in detail in the research methodology chapter. To briefly recap, the DISC score provides details of the beliefs from central managers towards the idea of pursuing a PSS productization strategy. It does so in terms of the Direction of the belief (whether it a positive a negative belief), the Importance of the belief (whether the belief was important in terms of influencing decision making and behaviour), the Strength of the belief (whether the belief was strongly held or weakly held) and the Consistency of the belief (whether the belief was generally held by all central managers or did different central managers hold contrary or opposing beliefs).

The first data set provided in Table 10 represent observations of the attitudes towards developing a PSS productization strategy during the early phase of the data collection (Q1 2016).

Personal Beliefs	(D) Direction	(I) Importance	(S) Strength	(C) Consistency (5 = everyone agrees)	DISC Score
There is a large opportunity if we start to do manufacturing	+	5	1	1	5
There are large financial risks if we move into manufacturing	-	5	4	3	-60
We need to expand outside of the existing logistics market	+	5	1	1	5
Our competitors are not going into manufacturing (so we shouldn't either)	-	5	5	2	-50
We can bring something competitive to manufacturing	+	4	2	1	8
This can increase profit for the company	+	5	1	2	10
This could provide an opportunity to lock customers in	+	3	3	5	45
This could provide a USP to be able to sell more of our core services	+	5	3	1	15
TOTAL		37	20	16	-22

Subjective Norm	(D) Direction	(I) Importance	(S) Strength	(C) Consistency (5 = everyone agrees)	DISC Score
This is good for our shareholders	+	4	1	2	8
This is good for our employees	+	4	2	1	8
This is good for our customers	+	4	1	1	4
This is what our peers would expect us to do	+				0
TOTAL		12	4	4	20

Percieved Behavioural Control	(D) Direction	(I) Importance	(S) Strength	(C) Consistency (5 = everyone agrees)	DISC Score
We are able to execute this	+	4	2	2	16
TOTAL		4	2	2	16

Table 10 : Initial attitudes of central management towards pursuing a PSS productization strategy (Q1 2016), using mechanisms 1.1 of the ATBV conceptual framework

The table shows the eight salient beliefs that were observed by central managers about pursuing a PSS productization strategy and provides a DISC score for each belief and an overall DISC score in terms of personal beliefs, subjective norms and perceived behavioural control (in line with the theory of planned behaviour (Ajzen, 1991).

Only eight personal beliefs are included in the data as, in line with the theory of planned behaviour (Ajzen, 1991), only six to eight salient beliefs influence decision making (Conner and Armitage, 1998). Thus, although many different beliefs and attitudes were observed within the CasComp, the aim is to understand the salient beliefs, as it is these salient beliefs that create attitudes and lead to behaviours. The salient beliefs were those that scored the highest in terms of importance and strength of belief. Thus, although the list of observed beliefs within the CasComp about pursuing a PSS productization strategy was long (more than 40 different beliefs were identified), by using the DISC method, it was possible to identify the salient beliefs.

The data reveal that within mechanism 1.1, personal beliefs were the most frequent and important belief types, but that also subjective norms and perceived behavioural control did play a part in the decision making. Despite subjective norms and perceived behaviour control playing a part, they were not found to be central to the decision making. In fact, only 4 beliefs related to subjective norms were identified, and only 1 belief related to perceived behaviour control. In contrast, more than 35 beliefs related to personal beliefs were identified (in the table, only the most important are provided).

The fact that perceived behaviour control was not considered important is perhaps not surprising. As the individuals observed held the most senior positions in the CasComp, it is likely that the individuals held a tacit belief that they had the control to do what they wanted, and thus there was little or no observed discussion about whether they had the power to pursue a PSS productization strategy or not.

In terms of subjective norms, the data show that the impact on both employees, customers and the CasComp shareholders were considered when considering developing a PSS, but also that there was a high level of disagreement between the CasComp central managers (reflected in the low consistency score for these beliefs), on whether pursuing a PSS productization would be a good thing or bad thing for employees and shareholders. As an example of the beliefs observed

related to the impact of pursuing a PSS productization strategy on existing employees, one CasComp manager stated:

> *"manufacturing may represent a good opportunity for the company, but we have thousands of logistics experts in our business, and we need to consider what this could mean for them if we communicate that manufacturing is our future"*

The fact that subjective norms did not play a more prominent role is perhaps surprising. According to many early PSS researchers, one of the primary drivers of pursing a PSS is environmental. The data from this research indicate that environmental considerations were not salient beliefs and that they did not have a major influence on deciding whether to pursue a PSS productization strategy. That is not to say that environmental considerations did not play a part or were not discussed, one Central manager commented:

> *"There is an environmental benefit to this solution – if we (CasComp) manufacture the products, we can do it closer to local demand and find local suppliers. This reduces the need to ship some basic components such as cables and packaging material all across the world, so we can help our customers reduce their environmental impact"*

Thus, although environmental concerns were considered, the belief was not salient and was not a key driver in the CasComp´s decision to pursue a PSS productization strategy. The data suggest that subjective norms should not be completely disregarded when aiming to understand firm-level decision making, but on the other hand, the data also suggest that the subjective norms are not as important as the personal beliefs.

Overall, the DISC scores provided show a level of reluctance of the CasComp central managers to pursue a PSS productization strategy. Such data are provided as it is considered insightful to understand not only why a firm may pursue a PSS productization strategy, but equally why it may not. In fact, most research to date uses case studies of firms that have decided to pursue a PSS strategy, and there are few examples of case studies where a firm elects not decide to pursue such a strategy. Thus, the data provided on the DISC scores observed during the early stages of

this research are useful as the data demonstrate how DISC scores and negative attitudes about a new productive opportunity can hold back a firm from pursuing the productive opportunity.

The data reveal that there were two beliefs with high negative DISC scores (-45 and -50), that were key beliefs in the CasComp that initially led the firm to be reluctant to pursue a PSS. The first (with a DISC score of -45) was the perceived high levels of financial risk related to pursuing a PSS productization strategy. As the data show, the CasComp central managers considered this as an important consideration and they strongly believed that pursuing a PSS would incur a high level of financial risk. However, this was not a consistently held belief, as some managers believed that the risk was not so high, as it could be managed and mitigated. However, enough of the CasComp central managers held this belief that it served as a major constraint to pursing a PSS productization strategy.

The second belief that led to the firm being reluctant to pursue a PSS productization strategy, with a DISC score of -50, is the belief that as the CasComp´s competitors were not pursuing a PSS productization strategy (at least not openly). This belief led some of the CasComp central managers to believe that there must be a good reason why the competition were not pursuing a PSS productization strategy, and this alone was enough to convince the CasComp central managers that it was not a good strategy for the CasComp.

As this research proposes a high level of interactivity between central management attitudes and central management time allocation, the interaction between the two is worthy of further investigation. It may at first be tempting to assume that a high overall positive DISC score would result in lots of central management time being spent on discussing the productive opportunity. However, this was not found to be the case. In fact, the data in Table 10 show that there were high levels of variation in the salient beliefs among central managers, some with beliefs with high positive DISC score and some with high negative DISC scores. It was observed that these variations in DISC scores resulted in lots of central management time discussing the productive opportunity. As such, high levels of variance in the DISC scores resulted in more central manager time being spent discussing the productive opportunity. This is quite logical. If all central managers had a high positive belief about a pursuing a productive opportunity, it is likely that not much time is needed for discussion, and the productive opportunity can be quickly introduced into the firm. Equally, if all central managers have a high negative belief of a productive opportunity, it is likely the opportunity will be rejected quickly, and not much time will be spent on it. However, if there

are many varying and opposing beliefs (in other words a low level of Consistency, as measured in the DISC score), more time will be needed to agree on a consensus among central managers as to whether to pursue the productive opportunity. Thus, it is found in this research that the amount of time central management spent on considering the productive opportunity (mechanism 1.3) was driven mainly by the variance in the DISC scores of the salient beliefs, rather than the overall absolute DISC score numbers.

Whereas the data presented in Table 10 show the beliefs and attitudes of central managers in Q1 2016, the data in Table 11 represent observations of the attitudes towards developing a PSS productization strategy during the latter phases of the data collection period (Q3 2017).

Personal Beliefs					
	(D) Direction	(I) Importance	(S) Strength	(C) Consistency (5 = everyone agrees)	DISC Score
There is a large opportunity if we start to do manufacturing	+	5	1	1	5
There are large financial risks if we move into manufacturing	-	4	1	5	-20
We need to expand outside of the existing logistics market	+	5	3	3	45
Our competitors are going into manufacturing (so we need to do also)	+	2	5	2	20
We can bring something competitive to manufacturing	+	4	2	1	8
This can increase profit for the company	+	5	2	3	30
This could provide an opportunity to lock customers in	+	3	3	5	45
New manufacturing technologies may impact supply chains, which impacts our existing business	+	5	3	3	45
TOTAL		33	20	23	178

Subjective Norm					
	(D) Direction	(I) Importance	(S) Strength	(C) Consistency (5 = everyone agrees)	DISC Score
This is good for our shareholders	+	4	1	2	8
This is good for our employees	+	4	2	1	8
This is good for our customers	+	4	1	1	4
This is what our peers would expect us to do	+				0
TOTAL		12	4	4	20

Percieved Behavioural Control					
	(D) Direction	(I) Importance	(S) Strength	(C) Consistency (5 = everyone agrees)	DISC Score
We are able to execute this	+	4	2	2	16
TOTAL		4	2	2	16

Change between Q1 2016 and Q3 2017

Table 11 : Attitudes of central management towards pursuing a PSS productization strategy during the latter phases of the data collection (Q3 2017), using mechanisms 1.1 of the ATBV conceptual framework

The data in Table 11 are provided to demonstrate how firm central management beliefs changed over time. In the table, any observed change in belief is highlighted in grey. If no change was observed, then the belief and DISC score is not adjusted from the data provided in Table 10.

Two types of change are noted. Firstly, it is noted that in some cases the salient belief itself changed, such as the belief that changed from “our competitors are not going into manufacturing, so we shouldn´t either” to “our competitors are going into manufacturing, so we need to do also”. Whereas for other beliefs, such as “there are large financial risks if we move into manufacturing”, the salient belief remained, but the DISC score factors changed. These two types of changes are explored in more detail, as they provide the insight as to what beliefs changed that first made the CasComp central managers reluctant to pursue a PSS productization strategy in Q1 2016 to eventually electing to pursue a PSS productization strategy in Q3 2017.

In the Q1 2016 DISC score, CasComp managers held the belief that as competitors were not moving towards a PSS via productization, then this created the belief that CasComp should also not pursue a productization strategy. However, once CasComp managers became aware that some competitors were also considering productization strategies (specifically UPS announced plans to create a new digital manufacturing business solution), then this created the belief that CasComp should also develop a PSS productization strategy. This indicates that the behaviour of the competition had a major influence on CasComp´s decisions about pursuing a PSS. This example also illustrates how new information from the market (represented as flow “a” in the ATBV framework) can influence a change in the attitudes of central managers.

The second belief change is the identification of the belief that “new manufacturing technologies may affect supply chains, which impacts our existing business”. This new belief was observed when one central manager was asked about the future impact of 3D Printing on global supply chains. Specifically, the manager was asked:

> *“Why should we (CasComp) get into 3DP manufacturing? We are not manufacturers and it is not our core competence”*

To which the CasComp central manager replied:

"We need to gain knowledge about 3DP, as this is a technology that could have a major impact on supply chains, and the best way to gain knowledge is to start to use the technology. If it was just a case of one manufacturing technology replacing an existing manufacturing technology, I agree, we would not need to get involved, but when the new technology could have such a big influence on supply chains and our existing logistics business, we cannot ignore it"

Thus, the initial belief about developing a PSS productization strategy could be characterised as representing a positive belief about PSS offering a new productive opportunity for the firm, but a belief that was not strongly held and not consistently held by all central managers (DISC score +15 in Table 8). In Table 11, this belief altered, and rather than PSS being seen as an opportunity, it was considered a possible threat to the existing business model. This belief that PSS could be a threat to the existing core logistics models was strong and consistently held (see Table 10, DISC score +45).

As well as the two beliefs that were observed to have changed, three other beliefs changed, but only in terms of their DISC score. The belief that there were large financial risks if the CasComp moved into manufacturing moved from a DISC score of -60 (Table 10) to a DISC score of -20 (Table 11). This change was predominantly the result of discussions and analysis by the CasComp to find contractual means to minimise financial exposure. As the CasComp gained new knowledge about the contractual methods used by other manufacturing firms to manage financial risk, the belief that developing a PSS productization would incur high financial risks became weaker, and there was increased consistency and agreement between firm central managers on the financial risk.

The belief that the CasComp needed to expand beyond their core logistics market also changed from a DISC score of +5 (Table 10) to a DISC score of +45 (Table 11). This change of DISC score was driven mainly by feedback from existing customers about the demand for the CasComp to offer something beyond traditional logistics services and to provide a differentiated offering from other logistics providers. As one customer commented to the CasComp managers:

"We have sat through the presentation of 3 of your competitors, and each one has told us exactly the same story that they are global, that they are large, that they have a world-

class I.T and lean approach, we are looking for an LSP that can provide something different and new"

Such customer feedback encouraged the CasComp central managers to actively look for areas of differentiation, and the fact that PSS productization was acknowledged by customers as something different, raised the importance of this belief and also the strength in the belief that PSS productization could provide a differentiating factor for the CasComp.

Lastly, the belief that PSS productization could bring profit to the company increased from a DISC score of +10 (Table 10) to a DISC score of +30 (Table 11). This was driven by the success of some (relatively small) business wins from the PSS productization that did generate profit for the CasCom. Despite these wins, there remained some doubts from some central managers on whether these wins could be scaled up to make a significant contribution to profit, hence why the DISC score, although higher, remained at only +30 (Table 11).

This section has demonstrated how central management attitudes towards a certain productive opportunity can change over time, with Table 10 indicating a negative attitude towards pursing a PSS productization strategy and Table 11 indicating a more positive attitude towards developing a PSS productization strategy. However, as indicated in the theory of planned behaviour (Ajzen, 1991), a positive attitude does not immediately result in behaviour actions, it first leads to an intention to act. This distinction between intention and action is discussed in the following section.

6.9 Central management intentions and actions

In line with the theory of planned behaviour, the ATBV conceptual framework shows that a distinction should be made the intention to do something and the act of doing something (Ajzen, 1985; Conner and Armitage, 1998). This important distinction was found to be relevant for this research. On one hand, it is tempting to assume that central management have ultimate power and control of the firm, and thus if they intend to do something, then it always happens.

This was not found to be the case, and sometimes a distinction was observed between

a) What the central manager indicated they would do (their intention)

b) Their actual behaviour (what they actually did)

The data for (a) are collected from the meeting minutes of the innovation board. In these, it was found that the innovation board meetings between 2016 and 2017 generated 146 action items in the minutes. These action items can be considered as “intentions” to do something. Of these 146 intentions, 107 were found to have been completed. Thus, these 107 completed actions can be considered as b) actual behaviour.

The distinction between the (a) intention and (b) action can be highlighted in the example observed of a central manager stating that they would hire a new manufacturing sales manager. At the time the action was agreed, one could assume it was the intention of the central manager to hire a new sales manager and in the meeting minutes (as observed in the meeting) it was also noted that the central manager would hire a new sales manager. However, in reality, the central manager was unable to hire a sales manager due to difficulties obtaining approval from other stakeholders not present in the meeting. Thus, the importance of differentiating between the intended behaviour and the actual behaviour is demonstrated.

In another example, the central manager stated that they would look for an alternative supplier for the development of a new manufacturing solution. This can be considered as the intention. It was found that the central manager did look for an alternative supplier, so the action was completed, but the central manager was unable to find an alternative supplier. Thus, in this example, the action of looking for a supplier was completed as intended, but the intention of finding a new supplier was not converted into the act of finding a new supplier and thus the CasComp did not make any meaningful changes as a result of the intention.

These examples do demonstrate the importance of understanding the subtle differences that may result in a productive opportunity not moving from (1) central managers to (2) general managers via flow (d) in the ATBV conceptual framework. As the data and examples show, one should not assume that just because central managers have a favourable attitude to developing a particular new productive opportunity and spend time on that idea, that the favourable attitude will result in actions from central management and that these actions result in new firm-level strategy. On the contrary, the data show that several intentions did not result in a completed action. However, the data also show that many intentions did result in a completed action (107 completed actions from

146 initial intentions), which leaves the question of what becomes of the 107 completed actions inside the firm. This is considered next.

Of the 107 completed actions, 94 resulted in a time demand from general managers. Thus, it is proposed that there is a link between the actions of central managers (1.2) and time allocation of firm general managers (2.0). This link (represented as “d” in the ATBV conceptual framework) is important, as the ATBV framework proposes that how general managers allocate their time is key to driving the behaviour and performance of the firm. Thus, understanding how central management influence how general managers spend their time is considered in more detail in the following section.

6.10 Ways in which central management atttitudes were observed to have an impact on general management time.

It was observed that central management could have a major influence on how general management assigned their time. Four key means with which central managers influenced how general managers spent their time were observed: Firstly, central managers were able to change the title of a general manager to give a signal as to where that general manager should be spending time. Secondly, central managers could use annual objective setting to direct general managers to spend time on certain activities. Thirdly, central managers were able to allocate specific projects to general managers and lastly, central managers could reduce the amount of time general managers spend on certain activities by cancelling specific projects general managers were working on and thus freeing up their time to look for new productive opportunities. Examples of each of these four means that central managers could influence general management time allocation are provided in the following paragraphs.

Firstly, an example of a central manager changing the title of a general manager was observed when one general manager who in 2015 had the title “Head of Operations” in 2016 was given the new title of “head of special projects”. The impact on the general manager´s time was that with the title of head of operations, the focus of the role was on improving existing operations, or to use, the terminology from the ATBV framework, allocating time to 2.1 the existing business. However, the new title of “head of special projects” indicated that time should not be spent on 2.1 (the existing business), but instead should be spent on 2.2 looking for new productive

opportunities (or innovations). This example illustrates how decisions by central management can have a major influence on how general managers spend their time.

Secondly, it was observed that the use of annual objective setting by central managers could also influence how general managers allocated their time. In the CasComp, each central manager set 3-5 personal objectives at the start of each calendar year for their direct reports (general managers). These objectives provided a signal from central management to general management what the priorities for the general manager were, and were also found to influence how general managers spent their time. An example of this is one central manager who was given the specific objective of bringing a PSS manufacturing service to the market. The result was that this general manager spent no time on the existing business (2.1), but instead, spent time on 2.2 (looking for new productive opportunities) and 2.3 testing and developing the new PSS manufacturing service.

Thirdly, at a more tactical, project level, central management could also influence how general management allocated their time by assigning certain general managers to carry out specific projects. An example of this was one general manager who, after the firm had developed a new productive opportunity related to manufacturing, was asked to lead the implementation of the project for 4 months. As such, the general manager allocated 4 months of their management time to 2.4 (exploiting a new productive opportunity), thus reducing the time they had available to look for other new productive opportunities.

Fourthly and lastly, also more at a tactical level, central management could influence how general management allocated their time by specifically telling general managers not to work on a certain topic. This example existed for a general manager who was exploring one particular productive opportunity, but was asked to stop. The result was not so much that central management dictated what the general manager could spend their time on, but rather that by dictating what the general management could not spend their time on, the central manager freed up general management time, and general management had more capacity to allocate their time to other projects.

Although the data suggest that central management had a strong influence on general management time allocation, the next section considers whether the “3. The market” also influenced general management time allocation.

6.11 The influence of the market on general management time

As indicated in the ATBV framework it was found that the market can also influence how firm general management spend their time (flow (e) in the ATBV conceptual framework). It was observed in the CasComp that the market (mechanism 3 in the ATBV framework) did have a major influence on general management time and the time specifically dedicated to developing the PSS productization strategy. Interestingly, the examples show that a positive or negative market reaction can influence how general managers allocate their time. A number of instances are provided form the CasComp to exemplify this.

One example of how a market reaction can result in general management time being allocated from 2.2 (looking for new productive opportunities) back to 2.1 (focus on the existing business) was found when one existing, important customer escalated a problem with service delivery for the existing core logistics business. This can be described as a negative market reaction to the existing logistics services being provided. When this occurred, one general manager who had hitherto been spending time looking for new productive opportunities (2.2) was asked to spend time to resolve the problem in the existing business (2.1). As the general manager commented

> *"Of course we want to spend time on developing new ideas and solutions, but sometimes, when a customer screams for help due to a major operational issue, we have to focus on that first"*

This change of management time allocation was the result of an issue from outside of the firm (the market) and thus exemplifies how a negative market reaction can impact general management time allocation.

The above situation was in fact frequent and five examples of such an occurrence were identified. The situation was particularly evident for those general managers who had worked for the CasComp for some time. For these general managers, even if requested by Central Management to spend time looking for new productive opportunities, if the existing market and customers demanded management time, then the general managers time was focused on existing business (2.1)

The way that the market impacts general management time was frequently observed to be interactive. For example, one general manager identified a possible productive opportunity (2.2) with the development of a specific PSS productization offering in which CasComp would offer manufacturers the possibility to use the space in CasComp´s warehouses to carry out 3DP manufacturing activities. This general manager spent time testing and developing this idea in the market (2.3), but the market reaction was mainly negative. The customer commented

> *"It is not space we need from CasComp, we can find that ourselves, it is customers and sales. If your solution doesn´t help to bring that, it is not of interest to us"*

The result was that this manager returned from spending time testing and developing (2.3) the specific PSS productization offering, and returned to spending time looking for new productive opportunities (2.2).

Alternatively, a different general manager who spent time developing a different PSS productization offering, one in which CasComp would offer to manufacture spare parts on-demand using 3DP. This solution was presented to several customers (the market) and it was found that the market responded in a positive way to the offering. As the CasComp general manager explained:

> *"Customer´s love the concept we are proposing, but there is now an enormous amount of work to get the idea from a PowerPoint slide to a real, operational solution"*

As a result of the positive market reaction to the concept, an increased amount of general management time was further spent testing and developing the offering (2.3), reducing the general management time available to look for other productive opportunities (2.2). Such data align with Penrose´s idea that management time, in this case, specifically general management time, served as a key constraint in developing new productive opportunities. In fact, it was found that stage (2.3) in the ATBV framework was the stage where the CasComp had to take particular care with general management time. As indicated in the ATBV framework, management time spent on (2.3) does not directly lead to EBIT growth and does not directly result in new revenue streams, as it is only at stage (2.4) when the CasComp can begin to exploit the idea by providing the services and invoicing for it. Thus, stage (2.3) is a stage that can absorb a lot of management time but does not result in direct revenue or EBIT growth.

For the CasComp, one specific PSS productization idea, that of providing manufacturing of parts for customers using 3D Printing equipment, and combining this manufacturing solution with the core logistics service offering (thus creating a PSS), did move to mechanism (2.4) during the research period. This did result in new revenue streams for the CasComp (4.2). But, importantly, also resulted in a new constraint on general management time. Once the CasComp began to exploit this opportunity, management time was needed to implement and manage the new productive opportunity.

To conclude, this section has demonstrated that general management time allocation can be influenced by both the market and, as demonstrated in the previous section, by central managers. According to the ATBV conceptual framework, how general managers allocate their time results in different firm-level performance outputs. The data related to how general management time allocation results in different firm-level outputs are discussed in more detail in the next section.

6.12 Ways in which different general management time allocation resulted in different firm-level performance outputs

The ATBV framework proposes that if all general management time is allocated to focusing on existing business (2.1), then the main impact on firm growth is on (4.1) EBIT growth rather than new revenue growth (4.2). The ATBV framework also proposes that (4.3) high revenue growth requires the allocation of management time to (2.5) scale the new productive opportunity.

Although it was found to be practically difficult to quantify the number of central and general management hours spent on each mechanism of the ATBV framework, Table 12 aims to bring together the estimated number of central and general management hours allocated to each of the mechanisms of the ATBV framework and also add the data related to the growth types observed, specifically (4.1) EBIT growth and (4.2) new revenue growth.

		Year					
ATBV ref	ATBV mechanism	2012	2013	2014	2015	2016	2017
	Total Central Management Hours	12'800	12'800	12'800	12'800	12'800	12'800
1.0	Total Central management hours considered	1'152	1'152	1'152	1'312	1'312	1'344
	Central managememt time observed spent on:						
1.3	Existing business	1'152	1'152	1'152	1'152	1'152	1'152
1.3	Considering PSS as a new productive opportunity	0	0	0	160	160	192
2.0	Total General Management Hours available for PSS development	8'000	9'600	11'200	14'400	17'600	17'600
	General managememt time observed spent on:						
2.1	Existing business	8'000	8'000	6'400	4'800	4'800	4'800
2.2	Looking for new PSS related productive opportunities	0	1'600	4'800	6'400	6'400	4'800
2.3	Testing & developeling PSS productive opportunities	0	0	0	1'600	1'600	3'200
2.4	Exploiting new PSS productive opportunities	0	0	0	1'600	3'200	3'200
2.5	Scaling new PSS productive opportunities	0	0	0	0	1'600	1'600
4.0	Financial Performance						
-	Overall Firm revenue	100	103	104	86	75	80
4.1	Overall Firm profit (EBIT)	-0.006	0.005	0.017	0.020	0.016	0.018
-	Overall EBIT margin	-1%	1%	2%	2%	2%	2%
4.2	New PSS revenue stream created	0	0	0	Yes	Increased yoy by 50%	Increased yoy by 87%

Table 12 : Application of the ATBV framework to assess the links between management time and firm growth

The table represents the period from 2012 to 2017, as this was the period that most managers observed were involved in the development of the PSS productization strategy, and also because this wider period allows a broader study on the CasComp´s level of growth.

The table is divided into three sections. Referencing the ATBV conceptual framework, the first section (1.0) relates to central management hours. The second section (2.0) relates to general management hours and the final section (4.0) relates to the financial performance of the firm in terms of revenue and profit. A brief explanation is first provided about the data in each section.

(1.0) Central Management Hours

The data show that between 2012 and 2017 the number of central managers did not change, it remained constant at 12,800 hours. No additional central management capacity was added to the central management team. It was not possible to account for all central management hours spent, however, it was observed that in terms of dedicated time spent reviewing the existing business this remained constant at 1152 over the 6-year period. It was also observed that as of 2015 (with the creation of the new innovation board) specific central management time was allocated to

reviewing new productive opportunities and specifically for this research, reviewing PSS as a new productive opportunity.

(2.0) General Management Hours

It was not possible to calculate the total number of general manager hours available as the number of general managers equated to included thousands of general managers across the world. Instead, the captured hours relate to the hours of general managers available at the corporate head office. The hours available from these general managers increased from 8000 hours in 2012 to 17,600 hours, showing a steady increase in general management time availability.

Looking more closely at the amount of general management time observed, one can detect a pattern of time allocation, with time being increasingly moved from a focus on the existing business (2.1) to an increasing amount of management time being spent on first looking for (2.2), then testing (2.3), then exploiting (2.4) and lastly attempting to scale (2.5). Management capacity is increasingly added to the CasComp as this pattern develops.

(4.0) Financial Performance

Note that data related to (3) the market is not included in the table, as these data represent information that is independent of the firm. Hence, the next section of the table refers to (4.0) the financial performance of the firm. In line with the ATBV framework, the data provided relate to revenue and profit.

To protect confidentiality, the 2012 overall firm reported revenue is used as the baseline figure (represented as 100), and all other figures in the table are indexed to this number. To illustrate, overall firm revenue was found to decrease by 20%, from 100 in 2012 to 80 in 2017. However, during the same period, the EBIT grew from the equivalent of -0.6 to positive 1.8. As this nominal EBIT figure is relative to a baseline revenue of 100, the EBIT figure shown is the same as the EBIT margin.

The last row in the table represents the new revenue that was generated as part of the PSS productization strategy. At the request of the CasComp, this financially sensitive information is not provided in the table, but instead, relative numbers are provided. The data show that the first revenues from the PSS productization strategy were visible in 2015 and that these revenues increased by 50% in 2016, and a further 87% in the following year. It must also be noted that the starting revenues in 2015 were very small, less than 1% of the CasComp´s overall revenue, so the high percentage increases in years 2016 and 2017 should be viewed with this in mind.

With the three sections of the table explained, it is now possible to provide some general remarks about the data. Firstly, the data in sections (1) and (2) also show that as the amount of central management time spent considering new productive opportunities increased, the more general management time was moved towards exploring new productive opportunities. This suggests that there is an amplification effect between central management time allocation and general management time allocation.

In 2015, when central management began to dedicate time to look at new productive opportunities, the amount of general management time looking for new productive opportunities increased from 4800 hours in 2014 to 6400 hours in 2015. In addition, general managers also began to spend time testing, developing and exploiting new productive opportunities (0 hours in 2014 compared to 3200 hours in 2015). This amplification effect observed is visualised in Figure 17.

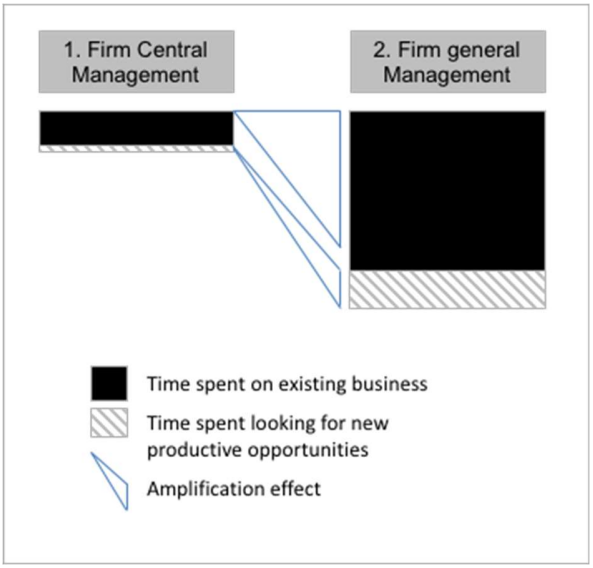


Figure 17 : Amplification of time allocation between 1. Central management and 2. Firm general management (created by author)

As demonstrated in the graphic, it was found that a small amount of central management time allocated to look for new productive opportunities, resulted in a larger amount of firm general management time spent looking for new productive opportunities.

The data in sections (1.0) and (2.0) in the table also indicate that in 2012, neither central management time nor firm general management time was being spent on actively looking for new productive opportunities. Interviews with the managers suggested that the reason was that the CasComp was losing money (also reflected in the table and the data provided in earlier sections). As a consequence of this, all management time was spent focused on turning around the existing business, rather than looking for new productive opportunities.

In 2013, even though the firm appeared to spend no time looking for new productive opportunities, the firm grew in terms of overall revenue and EBIT moved from negative to positive. From an EBIT perspective, the logic of the ATBV framework holds up in 2012, in that management time is dedicated to the existing business (2.1) which leads to (4.1) profit growth. Also, the ATBV framework holds up in terms of new revenue streams (4.2), if no management time is spent looking for new productive opportunities, then logically no revenue from new revenue streams is created (4.2).

Although overall firm revenue was not included in the ATBV framework, it is included in the table above to provide the wider context of which the CasComp was operating. It was, unfortunately, difficult to fully ascertain if the increased central management time looking at the PSS productization strategy in 2014 was a prescient move before overall firm revenues dropped significantly in 2015, or if this was just a coincidence. It was identified that the major drop in overall firm revenues in 2015 was due to a sharp drop in one particular customer segment of the CasComp´s core logistics business, rather than shift to spending more time looking for new productive opportunities such as the PSS productization opportunity.

The data also show that as the CasComp moved from being in a loss-making situation in 2012 to being in a profit-making situation in the following year, an increased amount of central

management time was spent considering new productive opportunities, and specifically, spent looking at the opportunity of PSS productization.

The data also indicate that as more time was allocated to mechanisms 2.4, that new revenue streams did become apparent for the CasComp. Finally, the data suggest that all though the CasComp has successfully managed to grow new PSS revenue streams, the PSS revenue streams are very small compared to the overall business. Thus, it cannot yet be claimed that the new strategy has resulted in high revenue growth (4.3). The CasComp continues to spend management time on (2.5) in an attempt to scale and grow the new revenue streams.

The allocation of management time shown in 2017 was found to reflect the real position of the CasComp at the time, where management time was constrained as the CasComp continued to use a significant amount of management time looking for new productive opportunities (4800 hours) and a smaller number of working hours (1600 hours) on scaling the new productive opportunities. This raises the question of whether this is the right allocation of time for the CasComp, and whether in fact more management time should be spent on scaling existing opportunities (2.5) than looking for new ones (2.1).

The data in this section indicate there is some element of correlation between management time allocation and firm performance. However, the data provided opens up interesting questions around cause and effect between time allocation and performance. For example, does the financial performance of the firm drive the allocation of management hours, or does the allocation of management hours drive the financial firm performance? Such interactions are explored and considered in the next section of this chapter.

6.13 Interactivity between time allocation of central managers, general managers and the market

Observations within the CasComp revealed a very high level of interaction and dependencies between the different mechanisms of the ATBV framework. Due to the high levels of interactivity, the interactivities observed are presented using a systems thinking chart (Senge, 2006) to show the direction of interactivity observed between the different mechanisms identified in the ATBV framework (see Figure 18).

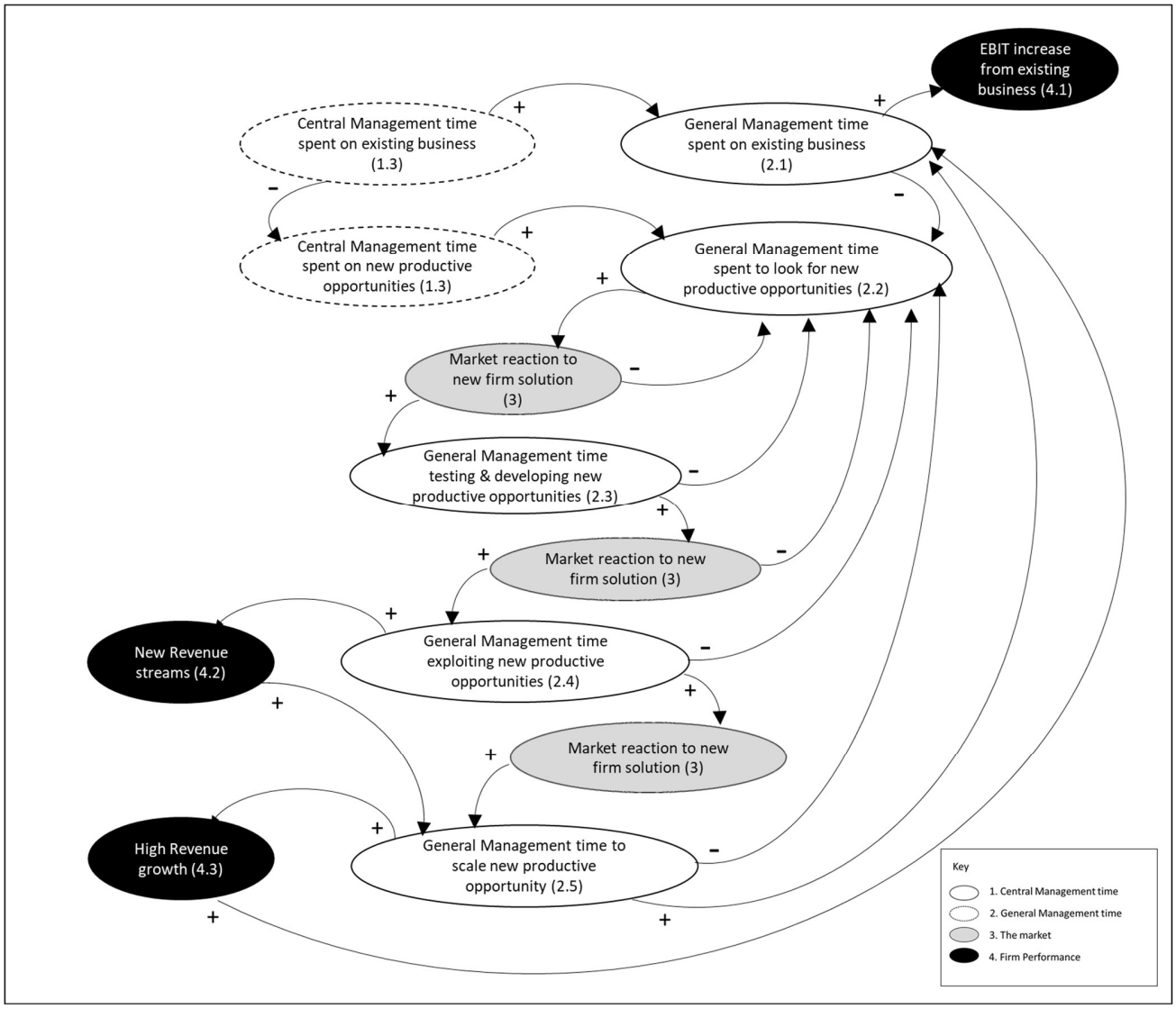


Figure 18 : Interactivity observed between the different mechanisms of the ATBV conceptual framework. (created by author)

The chart provides the mechanisms from the ATBV conceptual framework (with the references to the ATBV mechanisms provided in the brackets of each node) and the positive or negative interaction observed between the nodes. The interactions observed in the CasComp can be described as follows.

Starting with the node described as “central management time spent on the existing business” at the top left of the figure. Two interactions from this node were identified, one characterised as a positive interaction (represented as a + in the figure), and one characterised as a negative interaction (represented as a – in the figure). The positive interaction between the node “central management time spent on existing business” and the node “general management time spent on existing business” indicates that it was observed that the more time central managers spent on existing business, the more time general managers spent on the existing business (and thus a positive interaction is identified between the two nodes). Conversely, it was observed (but this could also be logically deduced), that the more time central managers spent on the existing business, this resulted in less time being available for central management to spend time considering new productive opportunities. Thus, a negative interaction was observed as the more time central managers on the existing business, the less time was spent considering new productive opportunities.

However, as central managers increased the amount of time considering new productive opportunities, this increased the amount of time general managers also spent looking for new productive opportunities (2.2). As general managers then spent more time looking for new productive opportunities (2.2), the market reaction to the new productive opportunity (3) also began to influence how general management time was used. If the market reaction to the new productive opportunity was negative, this reduced or freed up general management time to look for other productive opportunities (2.2). Hence, this is shown as a negative interaction between the nodes, as a negative market reaction reduced the amount of time general managers spent pursuing that productive opportunity. Conversely, when the market reaction to the new productive opportunity was positive, this resulted in more general management time being used to further test and develop the productive opportunity (2.3). Thus, a positive market reaction resulted in more general management time being allocated to the pursuit of the productive opportunity.

This same sequence can be followed all the way through the figure, in that when the market reaction to any new productive idea from the CasComp was positive, this then resulted in more general management time being needed to further exploit and scale that productive opportunity.

By node (2.4), when general managers began spending time exploiting a new productive opportunity, this resulted in (4.2) the growth of new revenue streams. But this new revenue growth

also led to more time being needed by general managers to scale the new productive opportunity (2.5).

As more general management time was spent scaling the new productive opportunity (2.5), this resulted in the growth of new revenue streams (4.3). However, these new revenue streams from the new productive opportunity (4.3) eventually became part of the existing day to day business, and this in itself begins to require more general management time, thus increasing the amount of general management time needed to manage the existing business (2.1) and returning the interactions of the nodes to the top right of the figure.

The figure illustrates the Penrose effect (Tan and Mahoney, 2005) in action, showing that there was a trade-off for the CasComp between spending central and general management time on the existing business with a focus on increasing EBIT from that existing business, or instead, spending central and general management time on looking for new productive opportunities in an attempt to identify new revenue streams. The figure thus challenges Penrose (1959) argument that revenue and profit (EBIT) are one and the same thing and instead shows that the two are distinct and that each one is influenced by how central and general management elect to spend their time. That said, the figure shows that revenue and profit (EBIT), although distinct, do interact and should be considered as part of a wider system. In fact, the figure demonstrates that the Penrose effect (Tan and Mahoney, 2005) can be best understood as a wider interaction of mechanisms, including management time allocation, the market, and ultimately the challenge of allocating precious management time to find the right balance of pursuing, on one hand, revenue from the identification and scaling of new productive opportunities and, on the other hand, increasing EBIT from existing business.

With all of the data presented from this research, it remains to provide some concluding remarks on the data as a whole, before returning to address the specific research questions set out in this research.

6.14 Concluding remarks on data and analysis

Penrose (1959) argues that the availability of management services is the principal over-riding constraint to firm-level growth. The data provided in this chapter suggests that Penrose´s insight is correct. However, the data also suggest that it is necessary to further specify and segment management services and make a distinction between central management and general management availability. With this distinction made, it is proposed that it is more accurate to state that the availability of central management time is the first key constraint to firm growth.

Moreover, the data show that central management time can be constrained in two ways: first, when no central management time is available as all central management time is spent focused on the existing business, and second, even when central management time is available to consider new productive opportunities, there may not be enough available central management time available to consider all available productive opportunities.

The data provided indicates that central managers elect whether to spend their time focusing on the existing core business or elect to spend time in the pursuit of new productive opportunities and that this decision is driven by central managers conception of their own firm and their "image" or beliefs about the market. The data in the previous sections provide an interesting insight for researchers about the debate on whether to begin firm-level research within the firm (internal) or about the image of the market environment of the firm (external). The data provided suggest that the key construct in understanding firm-level behaviour is neither the internal structure of the firm, nor the external state of the market, but rather the image or beliefs that central managers hold about the market.

The data show that by creating time for the central managers to look for new productive opportunities (through the creation of an innovation board), this gave central managers time to consider the development of new productive opportunities, such as the new development of a new PSS productization strategy.

The data provide detailed insight into the beliefs and attitudes of central managers about this specific idea of pursing a PSS productization strategy. The data show an evolution of the beliefs about pursuing a PSS productization strategy, and the evolution is shown using the DISC score. Such a level of detail and data provide deeper insight into how productive opportunities develop through the firm, and how beliefs about particular productive opportunities may change over time, and how eventually as central managers develop stronger positive beliefs and attitudes about a

particular productive opportunity, this results in central managers allocating general management time towards developing the new productive opportunity.

The data in the DISC score tables suggest that it is personal beliefs amongst central managers within the firm that decide if general management resource should be allocated to further explore and develop specific productive opportunities. Use of the DISC scores provides a new insight and understanding into how central managers decide whether or not to pursue a particular productive opportunity and how consensus is built among central managers on whether to pursue a particular productive opportunity. Furthermore, the data in the DISC scores show that if central management does decide to pursue a productive opportunity, there are various methods central managers can use to allocate general management time to lead the firm towards developing the productive opportunity further.

The data also provide insight into how the allocation of general management time results in a different type of growth focus. The data show that when all general management time was focused on the existing business (2.1) in 2013 and 2014, then EBIT increased, but no new revenue streams were developed. The data also show that as increased management time (both central and general management time) was allocated to develop new productive opportunities (2.2, 2.3 and 2.4), this resulted in the development of new revenue streams. In this case, in the development of new revenue streams from the development of a PSS productization offering.

The chapter has provided some insight and discussion points generated from the data and analysis. However, the purpose of this research is not merely to provide insights from the data observed and analysed, but also address the research questions set out in this research. Thus, now all data have been presented and considered, the following chapter in this research returns to the original research questions set out, and drawing on all of the data and research from previous chapters, aims to address the research questions set out in this research.

7 Conclusions

This chapter is divided into four sections. The first section returns to the research questions set out at the start of this and specifically addresses each of the research questions set out. By addressing the research questions, this first section also specifies and highlights the contributions to knowledge that this research has generated. The second section lays out the management and practical applications of the knowledge created in this research. The third section acknowledges and highlights the limitations of this research and in doing so lays the foundations for the fourth and final section of this chapter, which sets out avenues for future areas of research.

7.1 Conclusions to research questions and contributions to knowledge

With some types of research, it is possible to conclude with a definitive answer to the specific research questions set out. This research, in line with the critical realism philosophy adopted, does not aim to provide a definitive answer to the research questions set out, but rather use the research questions as a means to contribute to the development of new knowledge. As such, this section returns to the specific research questions set out in chapter 1 of this research and each research question is individually addressed to bring together the contributions to knowledge generated from this research.

For convenience, the research questions that appeared in the first chapter of this research are first reiterated. Each research question is then followed with an answer based on the findings in this research.

RQ1: How does the theory of the growth of the firm (Penrose, 1959) explain the behaviour of a firm that seeks to grow?

Whereas Teece et al., (1997) propose that firms can be investigated from two theoretical perspectives (economic or strategic), this research finds that four possible theoretical perspectives are possible: Macro, economic, strategic or individual behavioural level. This research brings together different theories of the firm under these four perspectives, thus providing future researchers with a new way to classify theories of the firm. Furthermore, the

classification of theories of the firm into the four perspectives provides this research with a means to evaluate the theory of the growth of the firm (Penrose, 1959) *vis-à-vis* other different theoretical perspectives.

This research finds that, unlike the classical economic theories of the firm which focus primarily on understanding external market factors and their influence on the firm, the strategic perspective places its focus on understanding the internal aspects of the firm. It is from such arguments that this research argues that a strategic level perspective is the correct point of initiation to investigate firm-level behaviour. Within the strategic perspective, this research considers the Resource-based View (RBV), (Barney, 2001; Wernerfelt, 1984) and the Theory of the Growth of the Firm (TGF) (Penrose, 1959) as possible strategic level theories that can be used to investigate firm-level behaviour.

This research finds that much researcher time is used to discuss and debate the nuances of RBV, with focus on, among other things, how best to define a resource and how to understand which resources hold the key to a sustainable competitive advantage. In fact, this research finds that a return to Penrose´s (1959) original TGF ideas renders such discussions irrelevant. For Penrose (1959), the single most important resource is existing management services available to the firm, all other resources are secondary to this. Also, for Penrose (1959), the predicted output of the theory is not related to how firms attain a sustainable competitive advantage (a term that is found to be difficult to define and investigate), but rather how firms grow and why. Thus, this research proposes that there are key differences between Penrose´s (1959) TGF and contemporary RBV, and that the latter should not simply be seen as an improvement of the former. Instead, this research argues that RBV and TGF are distinct theories, an argument which is contrary to many contemporary researchers who argue that the former is a development of the latter or even that they are one and the same thing (Mahoney and Pandian, 1992).

As well as highlighting the differences between RBV and TGF, this research argues that TGF holds up against many of the contemporary critiques of RBV. Moreover, this research argues that there remains a considerable body of knowledge within TGF (Penrose,1959) which has not received the attention warranted. In fact, it is found that the contemporary focus on RBV has deflected attention away from some of the key ideas developed by Penrose (1959) in TGF, particularly the key insight that management capacity (time) is the key resource in the firm. Thus,

this research has shone a new light on some of the original ideas from TGF and brought new insight and critiques to both RBV (Barney, 2001; Wernerfelt, 1984) and TGF (Penrose, 1959).

As well as highlighting the advantages of TGF over RBV, this research has also identified that gaps in TGF do remain today. One of the principal gaps identified in TGF (Penrose, 1959) is that the theory lacks a theoretical and conceptual framework to link together the different mechanisms within the theory. Thus, one is left with a theory that rings true, but with no discernible framework from Penrose (1959) on how to apply or test the theory in practice. This research concludes therefore that Penrose´s (1959) theory is highly relevant to understand firm-level behaviour but, due to its lack of a theoretical framework, has limited practical applicability to understand firm-level behaviour. This is a critical gap identified in the theory of the growth of the firm (Penrose, 1959) and addressed in this research.

The lack of a conceptual framework for TFG (Penrose, 1959), prompted this research to develop its own conceptual framework based on an interpretation of Penrose´s (1959) theory of the growth of the firm. By developing the initial TGF (Penrose, 1959) into a conceptual framework, this research provides a new means to evaluate the theory and assess its relevance for explaining firm-level behaviour. Moreover, the creation of the conceptual framework allowed this research to identify and highlight where gaps in TGF remain. Specifically, this research identifies seven gaps in TGF (Penrose, 1959) and addresses six of the identified gaps. The seventh gap, that of understanding the influence of knowledge on firm behaviour is only partially addressed and as such this is discussed in more detail in the later sections of this chapter which relate to further research.

A summary of the gaps identified in TGF and the ways in which this research has contributed knowledge to address the gaps identified are presented in Table 13.

Gap	Gap identified as existing today in the theory of the growth of the firm	Principle gap addressed in this research	Ways in which this research contributes knowledge to address this gap
1	The theory of the growth of the firm is not developed into a widely accepted theoretical framework	Yes	This research has developed a new conceptual framework, the Attitude and Time Based View (ATBV) conceptual framework,

			which is based on the original ideas of the theory of the growth of the firm (Penrose, 1959) and complemented with ideas from the theory of planned behaviour (Ajzen, 1991).
2	The theory provides no clear definition of how to measure growth	Yes	This theory recognises the difficulty of measuring firm-level growth. But, this research argues for the use of revenue and profit as the principal measures of firm growth. The research argues for two distinct measures of growth which are incorporated into the ATBV framework.
3	Although the theory recognises the importance of management attitudes and perceptions, it does not provide a means to investigate nor understand how these attitudes influence the direction of the firm	Yes	Through the development of the ATBV framework, and particularly by complimenting the theory of the growth of the firm (Penrose, 1959), with the theory of planned behaviour (Ajzen, 1991), this research provides a new means to understand how management attitudes influence behaviour and time allocation within the firm. In particular, this research provides insight into the internal and external factors considered by the CasComp managers when deciding whether to continue with its existing course or change the direction of the firm. This research argues that external factors per se

			are not important, but rather the image or perception that internal managers have of these external factors is the key to understanding firm-level behaviour
4	The theory does not fully explain in what way internal resources interact with external market forces to set the direction of the firm	Yes	Through the development of the ATBV framework, this research shows how internal factors interact with external market forces and how the two factors interact, with the firm influencing the market and the market influencing the behaviour of the firm.
5	The theory of the growth of the firm (Penrose, 1959) proposes that knowledge is a positive contributing factor, but the theory does not consider that knowledge can be a barrier to firm growth	No, only partially addressed	Rather than focusing on knowledge, this research argues that the beliefs and attitudes of central management are a more important factor in setting the direction of the firm. It can be argued that individual knowledge influences the creation of individual beliefs and attitudes, and thus knowledge is an antecedent to belief and attitude creation. Although not explored in detail in this research, it is argued that this insight provides an interesting line of research for future researchers.
6	The theory does not explain how different elements of the theory are linked together	Yes	With the creation of the new ATBV framework, this research aims to provide a new conceptual framework to link together the

			different elements of the theory of the growth of the firm.
7	Penrose´s (1959) theory identifies that management services are the key constraint to growth, but does not go on to explain how to measure this constraint and how managers within the firm adjust their behaviour to overcome the constraint.	Yes	This research proposes the use of the ATBV framework as a means to provide new insight into how management time can constrain the firm´s ability to look for new productive opportunities. The research proposes that even when time is made available to consider new productive opportunities, the availability of management services constraints the firm´s ability to test, develop, exploit and scale these new productive opportunities.

Table 13 : How this research has addressed the identified gaps in the theory of the growth of the firm.

It is from the identification of these gaps in TGF (Penrose, 1959) that this research seeks to address the gaps and contribute new knowledge. It does so by developing a new ATBV conceptual framework to address the lack of a TGF conceptual framework (gap 1). From this, this research highlights that Penrose (1959) fails to provide a satisfactory method to measure firm-level growth (gap 2). Penrose (1959) argues on one hand that firm-level growth should be measured through revenue and profit, arguing that they are one and the same thing (Penrose, 1959), but on the other hand and contrary to this, Penrose (1960) then proposes using the value of fixed assets to measure growth when applying TGF in her own single case study (Penrose, 1960).

This research argues that revenue and profit are the right means to measure firm-level growth, but unlike Penrose (1959), this research argues that they are not one and the same thing and should be measured independently. The research also proposes, through the mechanisms of the ATBV conceptual framework, that whether growth occurs in terms of revenue or profit is related to the amount of management time spent pursuing new productive opportunities or exploiting

existing productive opportunities. Moreover, this research specifically argues against the notion of using fixed assets or number of employees as a means to measure firm growth, arguing instead that firm-level growth should be measured by elements outside of the direct control of the firm, namely revenue and profit, as these elements are beyond the direct control of the firm and mediated by the external market.

Another key gap identified in TGF (Penrose, 1959) and addressed in this research relates to the importance of individual managers and their influence on the behaviour of the overall firm (gap 3). TGF proposes that a firm is essentially a group of individuals working together to achieve something (Penrose, 1959). Such a proposal places the emphasis on understanding the key individuals within the firm, and how their individual behaviours combine to collectively set the direction and behaviour of the firm. Although Penrose (1959) stresses the importance of individual behaviours and motivations on the direction of the firm, Penrose (1959) does not provide a means to seek to understand how different individuals interact to influence the direction of the firm.

The research argues that it is not possible to investigate the interactions of every single individual in the firm. Instead, this research proposes that managers within the firm should be classified into two groups, central managers and general managers. By separating the two management types, this research aims to provide a deeper understanding of the different attitudes and beliefs of central managers, who are the final arbiters of firm-level strategy. This research seeks to understand how the attitudes of these central managers influence decision making and the overall behaviour of the firm. Moreover, the use of the term “central manager” used in this research to specifically describe those managers who need to approve a firm-level strategy, rather than the frequently used term “senior manager” which is vague, provides a high level of precision, a key requirement in the development of any theoretical ideas.

Thus, although Penrose (1959) recognises the importance of individual manager motivations and actions and their influence on the overall behaviour of the firm, Penrose (1959) proposes that it is too complex to understand these individual motivations within the theory of the growth of the firm. In contrast, this research does aim to address this complexity of individual motivations and behaviours and does so by complementing TGF (Penrose, 1959) with elements from the Theory of Planned Behaviour (Ajzen, 1991). These two theories are brought together in this research into the ATBV conceptual framework developed.

The new ATBV conceptual framework developed goes beyond TGF (Penrose, 1959), by creating a bridge between the strategic perspective of the firm and the individual perspective of the firm. By bringing together elements from the two theories into one combined ATBV conceptual framework, this research provides a new means for researchers to understand the impact of individual attitudes on strategic firm-level behaviours, and also understand the impact that management time has on overall firm-level behaviour and growth.

The creation of the ATBV conceptual framework also aims to provide insight into how internal resources interact with external market forces to set the direction of the firm (gap 4). This research proposes that it is not any objective external element that influences the firm, but rather how different external elements are perceived and understood by the managers within the firm, the so-called “image” of the market (Penrose, 1959) that influence firm-level behaviour. This research highlights that even managers within the same firm may perceive the same external market information differently, and it is only through an understanding of the beliefs and attitudes of the managers within the firm that one can seek to understand how external factors influence management attitudes, behaviours and ultimately overall firm-level behaviour.

Although this research does not delve into the interactions between knowledge and attitudes (gap 6), this research does highlight the need to further understand the interactions of knowledge and attitudes and their influence on the behaviour of the firm. This research proposes that this area of research warrants further investigation beyond the scope of this research and is discussed in more detail in later sections.

It is argued in this research that as well as not providing a conceptual framework, Penrose (1959), does not sufficiently explain how different elements of TGF are linked together and interact. This research concludes that the interactions within TGF are best considered as a system of interactions (Senge, 2006), with external market forces influencing management attitudes and behaviours, and management attitudes and behaviours influencing the firm, and subsequently the market. Thus, the ATBV conceptual framework developed provides a new means to understand the interactions between the different elements of the theory.

The ATBV conceptual framework created in this research also provides more clarity on Penrose’s key argument that management capacity is the principal constraint to the growth of the firm (gap 7). Although Penrose (1959) places great emphasis on the importance of the availability of

management services and the constraint it places on firm growth, Penrose (1959) does not provide a practical means to investigate and identify where the constraint is occurring. This research addresses this gap and suggests that management time is a more precise measurement to understand the availability of management services. Furthermore, this research proposes that studying where management time is used and constrained within the firm provides a deeper insight into the availability and constraints of management services and more importantly, how firms behave to overcome the constraints in their search for growth. It is from this key insight that this research aims to show how the theory of the growth of the firm (Penrose, 1959), explains the behaviour of a firm that seeks to grow.

The insight about the importance of management time as a constraint to firm-level growth developed from Penrose (1959) led to the question of how management attitudes influence how management time is allocated within the firm and how together these two elements influence the growth of the firm. This question is addressed in the second research question of this research.

RQ2: How do management attitudes and management time allocation influence the behaviour of a firm that seeks to grow?

As well as developing a new ATBV conceptual framework to address theoretical gaps identified in TGF (Penrose, 1959), this research has also applied the ATBV conceptual framework developed to provide new insight into how management attitudes and management time allocation influence the growth of the firm.

The new ATBV view developed in this research is applied and tested with the aim of challenging the widely held use of RBV (Barney, 2001; Wernerfelt, 1984) as a primary theoretical lens to understand firm-level behaviour. Instead of seeking to understand the behaviour of firms from a broad investigation into firm-level resources as outlined in RBV, this research proposes that the key to understanding firm-level behaviour is the investigation of central management attitudes within the firm and the investigation into how managers spend their precious time within the firm.

Consequently, the newly proposed ATBV framework developed in this research provides a more specific focus of investigation than RBV, by focusing the investigation on management attitudes and management time. But, the ATBV conceptual framework also provides a broader and deeper

insight into firm-level behaviour than TGF (Penrose, 1959), by including a means to understand central management attitudes and the allocation of management time.

To understand management attitudes, this research combines elements from TGF (Penrose, 1959) with elements from the theory of planned behaviour (Ajzen, 1991). By doing so it provides a new level of insight into the attitudes of central managers within a firm. It is found that an insight into the attitudes of central managers is key to understanding why firms elect to allocate precious management time to develop certain new productive opportunities for the firm and not others. This research finds that an understanding of the interaction between central management attitudes and overall management time allocation provides a useful means to understand firm-level behaviour. Specifically, it is found that central management attitudes are key to understanding why a firm would elect to allocate precious management time to pursue new productive opportunities, and not use that management time on the existing core business.

In particular, this research provides a means to combine the three elements of attitudes, time and firm-level growth into a new ATBV conceptual framework that provides

1) An understanding of central management attitudes and how these attitudes influence how central management time is used.
2) An understanding of how these central management attitudes can influence how central management and general management time is used within the firm.
3) An understanding of how the use of that overall management time results in trade-offs between spending time on the core business and spending time identifying and developing new productive opportunities.
4) How the time allocation of central and general managers can result in different types of firm-level growth.

The findings from this research demonstrate that the new ATBV conceptual framework can be used as means to understand why a specific firm sought to grow and explain how and why the firm identified and then pursued a specific productive opportunity. In the case of the firm used in this research, the findings provide new insight as to how managers at an LSP firm sought to grow. The findings also provide an explanation as to how central management attitudes changed over time and explain why and how the firm elected to allocate more central management time to identifying new productive opportunities, and as a result, less central management time to the

existing core business. The data in this research indicate how the change of time allocation resulted in the identification and pursuit of a new productive opportunity, that of the development of a new PSS offering.

The application of the ATBV conceptual framework highlights how central management time can be constrained within the firm, and also how the allocation of general management time can influence the overall behaviour of the firm. Moreover, the ATBV conceptual framework highlights how the management time constraint can move over time. For the CasComp investigated in this research, the ATBV conceptual framework highlights how initially central management time was constrained, resulting in most central management time being spent on running the existing core business. The result was that little management time was available to explore new productive opportunities (such as the idea of developing a PSS productization strategy).

Once this time constraint was addressed and central management had time to consider different productive opportunities through the creation of a new innovation board, it was found that an understanding of central management attitudes towards the productive opportunity was a useful means to understand how central management assessed the productive opportunity, and how the attitudes of central managers influenced the amount of central management time considering the new productive opportunity. Use of the ATBV framework suggests that central management attitudes influence how much central and general management time is allocated to consider the productive opportunity.

Interestingly, the ATBV framework found that when where there were different, mixed attitudes amongst central managers about the viability of pursuing the new productive opportunity (in this case a PSS), this resulted in a high amount of central management time discussing the idea. These different central managements attitudes observed as part of this research were measured and illustrated using a newly developed DISC score (Direction, Importance, Strength, Consistency). The new DISC score developed in this research adds an extra dimension to the theory of planned behaviour (Ajzen, 1991), that of consistency of the belief among managers. The addition of this consistency dimension provides researchers with a new means to investigate the collective attitudes of central managers within a firm. As such, the DISC score provides a new way for researchers to measure beliefs and attitudes of central managers and provide a deeper understanding of how these attitudes may change over time to influence the direction of the firm.

Furthermore, by employing a longitudinal research design, this research has demonstrated how the DISC score can be applied to measure central management attitudes at different points in time. Such an approach highlights how attitudes of central managers may change over time, thus resulting in different time allocation of managers, and ultimately different behaviours of the firm.

In addition, it was found that the ATBV framework can be used as a useful means to develop a deeper understanding of central management decision making. Knowing that central managers often have to interpret a large amount of information, some coming from within the firm and some coming from external sources, and also recognising that this information may often be contradictory and equivocal, the ATBV conceptual framework proposes that the key to understanding the decision making of central managers is not focusing on the information itself, but rather on how central managers interpret and create attitudes from the information received.

This deeper understanding of management attitudes and decision making adds complexity for researchers, as identifying and understanding beliefs and attitudes is difficult from a research perspective. But, in other ways, use of the theory of planned behaviour (Ajzen, 1991) also reduces research complexity, as it proposes that researchers need not consider all of the factors considered by central management when making decisions, but only those salient beliefs that influence their decision making. It is proposed that this insight, developed from the theory of planned behaviour (Ajzen, 1991) and applied in this research, is important for those seeking to understand management decision making, and in particular, those seeking to understand the decisions of central managers that result in the firm moving away from the firm´s existing core offering, to the development of new productive opportunities.

It was also found that use of the ATBV framework can explain the interactions between central management decision making and general management time allocation. Although Penrose (1959) identifies that availability of management time is the key constraint to firm growth, use of the ATBV framework provides deeper insight as to where management time may be constrained. It was found that in the case of the CasComp, once central management did agree to allocate general management time to pursuing a PSS strategy that the time constraint quickly moved from central managers to general managers. It was found that developing a new productivity opportunity such as PSS required general management to make trade-off decisions on how to allocate their time, including making decisions on whether to spend time on existing business or spending time developing new productive opportunities. Use of the ATBV framework was found

to be a useful means to understand more specifically where the time constraint was occurring for general managers.

In terms of measuring growth, the ATBV framework provides new insight into how firm-level growth can be measured. Penrose´s (1959) ambiguity on how to measure growth is a major gap in the theory. This research recognises the complexity of measuring growth and proposes that two different types of firm growth should be considered – EBIT growth and Revenue growth. The findings in this research show how the ATBV framework can be used to investigate the link between management attitudes and how these attitudes influence how management time is used. Next, the ATBV framework then highlights how the allocation of management time influences the type of growth achieved, either EBIT or revenue.

To conclude the response to RQ2, this research finds that central management attitudes have a major influence on the behaviour of central managers, both in terms of how central managers spend their time, but also on how central managers dictate and influence how other general managers in the firm spend their time. This research also finds that central management attitudes are influenced by the market as well as by central managements' perception of the firm itself, with both factors influencing how central managers elect to spend their time. This research also finds that managers need to make decisions on how to spend their time and that spending time in one area, logically results in a trade-off of time not being spent in another area. It is proposed that the overall behaviour of the firm can thus be understood from the perspective of how managers make these trade-off decisions and elect to spend time focusing on the current business, spend time pursuing new productive opportunities or making decisions on how to allocate their time across both. The research also suggests that it is not a linear interaction between attitudes, time and firm-level growth, but rather that there is a high level of interaction and dependencies between the three factors.

To conclude this section overall, it is worth returning to the initial discussion from the start of research related to what constitutes a theory, in order to assess whether the newly proposed ATBV conceptual framework meets the criteria defined by Whetten (1989). Whetten (1989) argues that firstly, a theory should identify the factors that should be considered when explaining the phenomena under investigation. It is argued that the ATBV framework meets this criterion in that the framework specifies the key factors of attitudes and time, and the key constructs of central management, general management, the market and firm-level growth. Whetten (1989) secondly

argues that the theory should explain how the factors are related. It is proposed that the ATBV conceptual framework also meets this criterion as the ATBV specifies the relationships between the factors included in the framework using a system's thinking type approach. Next, Whetten (1989) argues that the theory should explain the underlying dynamics to justify the selection of the factors and their proposed relationships. It is proposed that the ATBV conceptual framework also meets this criterion, as the factors included are selected based on the existing theoretical foundations of the theory of the growth of the firm (Penrose, 1959) and the theory of planned behaviour (Ajzen, 1991). Lastly, Whetten (1989) argues that the theory should specify when, to whom and where the theory is applicable. It is on this last point that it can be argued that the ATBV conceptual framework remains a view, and cannot yet be considered a theory, as although it is proposed that ATBV could be used to investigate any firm considering any new productive opportunity, as yet, the ATBV conceptual framework has only been applied in one case study, that of this research. As such, further testing and application of the ATBV conceptual framework will be required before it can make the claim to be a generalisable theory.

Although the ATBV conceptual framework has only been applied in one case study in this research, it has been designed not for the specific case, but rather in such a way that it can be applied by other researchers in future studies. However, this research has initiated the discussion on how to apply this ATBV conceptual framework by applying the ATBV conceptual framework in a longitudinal case study of an LSP considering pursuing a new PSS business model as a means to grow.

This section has sought to demonstrate the new contributions to knowledge that this research has created by addressing the two research questions set out in this research. However, as pointed out by Lewin, there is nothing so practical as a good theory (Lewin, 1951). Consequently, this research has sought to develop new theoretical knowledge not just for theories sake, but also to generate practical knowledge from the application and testing of the ATBV conceptual framework in a practical context. It is from applying and testing the ATBV conceptual framework that the next section aims to lay out the practical management implications generated from this research.

7.2 Management and practical implications

This research has contributed to the development of new practical knowledge in three ways. First, with the creation of the ATBV conceptual framework, this research provides a new practical framework for firms to consider what are the real constraints to firm-level growth and where are the constraints occurring. The research also emphasises the importance of managers over all other resources available to the firm. It argues that although managers often complain that their firm cannot compete and grow because of a range of issues: lack of senior management support, a competitor that has deeper pockets or a better I.T system, to name a few, the onus to overcome these challenges and to achieve growth is with firm managers. Furthermore, the research aims to demonstrate that if central management does not support an idea (as was the case with central managers at the CasComp when first considering a PSS business model), it is for other managers within the firm to change and influence those attitudes. Equally, if a competitor has deeper pockets, it is for creative managers to either find new productive opportunities that the competitor cannot match and/or find creative means to obtain the funds to be able to compete. Or, more radically, for managers to look for new productive opportunities in new markets in which the firm can compete. Whereas resource-based theory has allowed managers to point to a lack of specific resources that are holding back firm growth, this research has argued that there is only one ultimate resource that constrains growth, that of availability of existing management services. Thus, the research encourages managers to think about how to best make use of their services and particularly their time, and how best to use that time to overcome other constraints encountered.

Secondly, a further practical contribution of the ATBV framework, and particularly the DISC score used in this research, is the creation of a means to measure and eventually change central management beliefs and attitudes. A lack of senior management support is frequently pointed to as a reason for failure for many firm-level initiatives, whether this is an initiative to implement a new cultural change such as a large lean transformation, or, as in the case developed in this research, to develop and exploit a new productive opportunity. This research recognises the importance of obtaining central management support for firm-level initiatives but goes beyond just recognising it. With the development of the ATBV conceptual framework and the DISC score, this research provides a new way to investigate and understand the attitudes of central managers towards certain ideas. It is proposed that by gaining a deeper understanding of the attitudes of central managers towards specific ideas or new productive opportunities, it is possible for managers to develop specific plans to change central management attitudes and beliefs to influence decisions and the direction of the firm. Thus, this research challenges those practitioners

who conclude that an idea failed due to “a lack of senior management support”. It does so by making use of the term “central management” (Penrose, 1959) as a more precise definition of “senior management” within the firm. Then, through the development of the DISC score, this research provides a new means for researchers and practitioners to understand more specifically what central management attitudes are, and which beliefs may be blocking an idea not getting support with the firm. Such insight can be used by managers to influence those central management beliefs to gain the support needed to introduce a new productive opportunity into the firm.

Third, this research has provided new insight for those firms that currently only provide services but may be looking to add a production element to their offering to create a PSS. The research has provided a framework and practical example of how a service firm can look to make the transition from pure service provider to PSS provider. This research is particularly timely, as it is proposed that increased access to 3D Printing equipment is allowing a growing number of firms to be able to design and manufacture parts and develop productization strategies. Thus, it is envisioned that the development and adoption of productization strategies will increase in the future, and this research has provided a basis for further knowledge creation in this area.

Although this research has made significant contributions both in terms of theoretical and practical knowledge, it is recognised that the research is not without limitations. The limitations identified in this research are laid in the next section.

7.3 Research limitations

This chapter contains three sub-sections. The first sub-section considers the limitations of this research from a broad perspective. The second sub-section focuses more specifically on the identified limitations of the ATBV framework developed in this research. The third and final sub-section of this chapter draws on the limitations identified and provides avenues for further research to future researchers to continue the development of knowledge.

7.3.1 Overall research limitations

As with any such large piece of research, lessons are learned throughout the process, and a compromise is often needed between what should ideally be done and what can practically be

done to complete the study. Recognising that these compromises introduce limitations into this research, this section sets out these known limitations. The specific limitations of the research methodology are provided in earlier sections and thus are not repeated here. Instead, this section provides a broad overview of the limitations encountered when applying and executing the research methodology.

The primary limitation encountered was access to managers, particularly central managers, to be able to delve further into understanding their attitudes and beliefs related to PSS and productization. As proposed in this research, central management time is a major constraint for firms, and thus it is logical that central managers did not have much available time to discuss the nuances of their attitudes for the purpose of this research. Consequently, it is possible, indeed probable, that some interpretations of certain attitudes and beliefs were not correct. This is partially mitigated by having multiple observations over a prolonged period of time, giving the researcher more chance to detect patterns of behaviour and consistency of attitudes. Related to this, is the limitation that attitudes of central managers were deduced from their behaviours. Although it is more common to use questionnaires or interviews to directly ask participants to elicit their beliefs and attitudes, it was elected in this research to observe managers' behaviour and aim to understand their attitudes based on their behaviour. This of course can result in error. However, it is argued that asking managers their attitudes also has major limitations, such as managers not revealing their true beliefs about a certain idea or topic. In contrast, one of the key advantages of using observation (as in this research) is that the behaviour of managers is an observable event that can be witnessed, recorded and interpreted.

The second limitation can be found on the practical difficulty of recording how management time is used. Of course, the technical methods exist that can be used to record hour by hour what time is being spent on, but the potential for privacy issues and the difficulty of convincing senior managers to record and share how their time is spent pose practical problems for researchers in this area. It is acknowledged that the hours provided and recorded here are estimates based on the observations within the CasComp, and more sophisticated measurement techniques would be required to gain more accurate data on the exact number of hours spent. For this research, however, such a level of accuracy was not required, as it was not the intention to track specific hours in detail, but more to understand the spread of time allocation amongst managers and understand where management time became constrained.

The third limitation is related to the scope of this research, and particularly the mechanisms included in the ATBV conceptual framework. Although it is noted that the knowledge and capability of managers are noted in TGF (Penrose, 1959) but also highlighted as a gap in TGF in so far as understanding how knowledge and capability influence firm-level behaviour, it was elected in this research not to consider knowledge and capability within the ATBV conceptual framework. This was a deliberate choice, rather than an accidental omission. The reason for electing not to include knowledge and capabilities in the ATBV framework is that it is considered that Attitude and Time have a larger influence on firm-level behaviour than capability and knowledge. This is worthy of further explanation.

Let us first consider the importance of time vis-à-vis capability and knowledge. It was considered that even if a manager has expert capability and knowledge, if they do not have the time to make use of that capability and knowledge, then this renders their capability and knowledge redundant. Consequently, management time was considered as a more important constraint than knowledge or capability. Second, let us consider the importance of attitudes vis-à-vis capability and knowledge. Although one could argue that capability and knowledge may be required to achieve certain actions, it can also be argued that capability and knowledge do not necessarily lead to actions. Conversely, the theory of planned behaviour (Ajzen, 1991) proposes a direct link between attitudes and behavioural actions. As such, it was determined that an understanding and investigation of management attitudes was more relevant and useful than an investigation into management knowledge and capabilities, as the former is more closely related to behavioural actions than the latter. Moreover, the theory of planned behaviour (Ajzen, 1991) does consider, to some degree, the capability and knowledge of a manager, under the guise of the mechanism of perceived behaviour control. It can be argued that an investigation of whether the individual perceives they can or cannot carry out an action (due to a lack of capability or knowledge) is partially captured in the measure of perceived behavioural control.

Overall then, although this research does recognise that scope does exist to extend the ATBV conceptual framework to include these mechanisms of management knowledge and capability, it was considered that attitude and time were more important influencers on firm-level behaviour than either knowledge or capability, and thus the elements of attitude and time remained the focus of the research.

The fourth recognised limitation is related to the time horizon. Although entrepreneurs who develop a new business idea and quickly create large firms often make the headlines, it was found in this research that ideas do take a long time to germinate and develop inside the firm. Thus, even researching the CasComp for 2 years found that this was not sufficient to witness a major impact in firm growth. It is of course possible that the ideas developed during the two-year research period within the CasComp do develop into highly successful ideas that result in significant growth, only time will tell. Of all the constraints identified this is perhaps the biggest one for researchers to overcome. Not every firm manages to grow significantly, thus researchers have the option of either waiting for firms to grow and then retrospectively trying to understand why they did, or alternatively, risk spending time in firms collecting first-hand data of the struggles to achieve growth, but in the end researching a firm that does not achieve growth. It is perhaps only from studying many firms, using similar research methods as used in this research that researchers can look to identify common traits and patterns of firms that do manage to achieve growth, versus those that do not.

The fifth and final limitation relates back to the application of the research methodology. But, rather than any specific limitation of the research design, the limitation relates to the more general notion of carrying out research while at the same time working as an employee in the organisation under investigation. This particular limitation is highlighted as it is noted that for any researcher that seeks to combine carrying out research whilst also working as an employee in an organisation, the decision as to whether to include or exclude the employee's organisation within the research is a difficult one.

During the early stages of this research, it was considered to investigate independent organisations and exclude the organisation at which the researcher was employed to reduce any risk of researcher bias. However, after numerous issues gaining access to independent organisations and in particular gaining timely access to be in the right place at the right time to observe decisions being debated and discussed by senior decision-makers in the organisation, the limitation of access into independent organisations became a major barrier. Moreover, it was found that allowing external researchers into meetings where decisions were being debated by senior decision-makers in the independent organisation, required a high level of trust from the senior leaders of the organisation. Gaining such a level of trust not only takes time but also places a high risk on the research if those with whom trust has been gained leave the organisation before the research has been completed. Thus, the decision to investigate the CasComp for this

research, where the researcher is also an employee, was initially a reluctant choice. Moreover, it was considered that researching an organisation where one is already employed would be unlikely to provide interesting new insight or knowledge and also, would likely draw critiques of researcher bias. However, although the decision to include the organisation where the researcher was also an employee was taken reluctantly, it is only now, when the research is complete that the advantages and disadvantages of this decision can be fully articulated.

In terms of the advantages, researching the organisation at which one is employed provides unprecedented access, not just to the formal meetings that take place, but also to the informal sharing of ideas, opinions and knowledge that occurs around the coffee machine and in other informal settings. Although in this research, it was elected not to include such informal data in the data analysis (and instead, the most data was collected from the formal meetings and workshops), it is also undeniable that the informal discussions provided insight as to which meetings to attend and which employees to observe and enabled a high degree of access for this research. Furthermore, being an employee of the organisation also provides access to certain formal meetings and discussions that an external researcher may be denied. For this research, it is likely that the researcher had access to certain meetings, particularly senior-level innovation board meetings, that one suspects the CasComp would have been reluctant to allow external researchers to observe for fear of commercially sensitive information being leaked or shared. But, it is such privileged access that also creates the risk of researcher bias, as one can question if the researcher is provided with privileged access to an organisation, would the researcher feel obliged to portray the organisation in a more positive light? For this research, a very deliberate and conscious effort was made to provide an objective, balanced view of the CasComp as it made the decisions about the right direction for the firm. However, even with the best and most noble intentions, it can also not be denied that an individual that is employed by an organisation is highly unlikely to be completely value-free, opinion free or even indifferent to the future of the organisation at which the individual is employed. On reflection, and in particular, on re-reading some of the interviews carried out for this research (see for example Appendix 2), one can detect words from the researcher that may have caused bias and encouraged different responses from the interviewee. An example is when the researcher states “I agree with you there” (see Appendix 2), words which in all probability lead the interviewee in a certain direction in later questions, where alternative words, or no words from the research, could have allowed the interviewee to provide different answers to later questions. Such an example is provided, not to discredit the data provided in this research, but rather to acknowledge that even with the best intentions, the

transcript in Appendix 2 highlights that some bias may have occurred in this research. And, it is noted that if verbally transcribed data indicates examples of verbal bias, then it would be asinine to assume that non-verbal cues from the researcher during the interviews or observation sessions would also not have occurred to some degree and created potential for bias. It would be equally asinine to state that a researcher that is employed by the organisation under investigation is more likely than a researcher who is not, to have opinions and views about the organisation and the decisions of its managers that may result in research bias, and that any individual would be able to fully hide such opinions and views over such a long observation period. However, even with such limitations and potential for bias highlighted, this must be countervailed with the aforementioned advantages that one has as an employee, and in particular the access to central managers and key decision-makers. Overall then, even with the limitations noted, it is concluded that in this research which sought to gain in particular a deep insight into the attitudes and decisions of central managers, the decision to investigate the organisation at which the researcher was an employee, was the right one. In the end, far from not providing new insight and knowledge, it is hoped that by playing the dual and (mentally) separate role of researcher and employee in the organisation, this research has provided a unique view into the attitudes and time allocation of central and general managers in a large, complex organisation.

7.3.2 Critique and limitations of the ATBV conceptual framework

The ATBV conceptual framework is developed in this research as a means to enhance the theory of the growth of the firm (Penrose, 1959). But, it is recognised that, like the theory of the growth of the firm (Penrose, 1959), the ATBV conceptual framework also contains inherent limitations and does not address every gap in the theory of the growth of the firm (Penrose, 1959). Thus, this section provides a self-reflective critique of the ATBV conceptual framework based on the learnings of applying it in this research.

The ATBV conceptual framework was developed drawing on the existing theories of Penrose´s theory of the growth of the firm (Penrose, 1959). Ajzen´s theory of planned behaviour (Ajzen, 1985) and also drawing on the researchers own observations of the central and general managers in the CasComp. As such, the conceptual framework was a living framework throughout the research that was at various times, refined and tweaked, and at other times, completely redrawn. Despite this, it is recognised that several critiques of the ATBV conceptual framework remain.

The first critique relates to the mechanisms used in the ATBV framework that are selected from the theory of the growth of the firm (Penrose, 1959). Although the ATBV framework is positioned as a conceptual framework of Penrose´s initial theory, it is clear on reflection that the ATBV framework does not encompass all of Penrose´s ideas and mechanism. For example, the ATBV framework does not give due consideration to other strategic options for achieving growth, such as acquisition strategies. Instead, the ATBV framework focuses on one key area of Penrose´s theory, that of firms looking for new productive opportunities. However, one can argue that using management time to search for acquisition targets is just another use of management time, and as such, an acquisition is just another productive opportunity that a firm may elect to pursue.

It is also noted that, for a theory that has been so influential, the theory of the growth of the firm has not been widely applied nor tested. As such, the interpretation of Penrose´s (1959) theory and its development into a conceptual framework is drawn more from this researcher´s subjective understanding of Penrose´s theory, rather than from widespread learnings from other researchers who have applied and used the theory. Thus, other researchers are encouraged to apply Penrose´s theory, to promote more discussion and debate on the mechanisms included and how they interact. The conceptual framework provided here is but one interpretation of Penrose´s theory.

The second critique is related to the theory of planned behaviour (Ajzen, 1991). In contrast to Penrose´s (1959) theory which has not been widely applied, the theory of planned behaviour, and its predecessor the theory of reasoned action (Fishbein and Ajzen, 1977), have been applied extensively in many different contexts and have been subject to detailed empirical testing and critiques (Sniehotta et al., 2014). It is noted that in the development of the ATBV framework, only a few of the many examples of the theory of planned behaviour were considered and the decision was made, in the interests of scope and time, to avoid entering the debate into the limitations of the theory and wider consideration of alternative theories (Ajzen, 2015; Sniehotta et al., 2014). As such, it is recognised that the ATBV framework developed in this research accepted the key assumptions and mechanisms of the theory of planned behaviour (Ajzen, 1991) and only scratched the surface of the theory and deep knowledge available of its limitations and drawbacks. There exists, in this researcher´s view, significant potential to further develop and investigate the theory of planned behaviour (Ajzen, 1991) in the context of understanding firm-level behaviour, but, in the interests of scope and time, it was elected not to place a large

emphasis on this topic in this research. It is proposed in particular that there is significant potential to create bridges between knowledge related to the theory of planned behaviour, with its understanding of individual decisions and behaviour, and knowledge related to firm behaviour and strategy. If one agrees with the notion that a firm is merely a collection of individuals making decisions and behaving in certain ways, then the theory of planned behaviour, with its focus on understanding attitudes and behaviours, could provide important new insight into the links between individual attitudes and behaviour, collective firm behaviour and eventual collective firm success (or failure).

The previous two critiques are related to the development of the ATBV conceptual framework. In addition to these, further potential improvements to the ATBV framework were identified when applying the conceptual framework in this research. In particular, it is noted that more rigorous methods could be developed to define the attitudes under measurement at the start of the application of the framework. In this research, the measurement of attitudes towards the more general idea of a PSS productization strategy was considered. Such a broad scope allowed the capture of a wide range of ideas, but on reflection, the ATBV framework may be more appropriate, not for measuring attitudes about broad general ideas, but more for measuring attitudes about specific strategic options. For example, this research captured information about the beliefs and attitudes towards developing a PSS productization strategy, however, it was found that the term PSS productization strategy is broad and covered a number of specific productive opportunities that the CasComp considered. A focus on understanding the beliefs and attitudes towards the specific productive opportunities rather than the wider, more general PSS productization strategy, would allow a deeper interrogation and understanding of the attitudes of individual managers towards a specific productive opportunity.

In addition, on reflection, the methods used to track management time have potential for improvement. Although on one side it is easy to point to new technologies that could be used for much more accurate tracking of how management time is used, it should not be overlooked that most managers may be reluctant to provide such detailed information – both from a privacy perspective, but also in terms of the effort required by managers to track and record their time. Thus, although it is proposed that management time tracking could be much approved from this research, the personal barriers rather than the technological barriers should be the main focus for future researchers to overcome.

The application of the ATBV in this research by no means proves that it works. To make such a claim would require that the ATBV framework is applied multiple times, in multiple firms, looking at multiple different types of strategies. However, the application of the ATBV framework with the CasComp has demonstrated that it can work and can help to understand how individual attitudes interact with management time, and ultimately impact firm growth. In this sense, the new ATBV framework should be seen as an important first step in understanding these interactions in more depth, with potential for other researchers to investigate them in different contexts and using different research methodologies. Some initial ideas for ways in which future researchers could further develop the ideas generated from this research are provided in the final section.

7.4 Further research and discussions

The newly developed ATBV conceptual framework proposed opens up new questions both for researchers and practitioners.

The first question generated for researchers is whether it is possible to develop any one theory of the firm? This research has argued that rather than one theory of the firm, firms can be investigated from four different theoretical perspectives, with each allowing different types of questions to be asked of the firm. Like Teece et al., (1997), this research has argued for the need to develop theoretical frameworks that bridge the different perspectives. This research has proposed the ATBV conceptual framework as a means to bridge the strategic and the individual perspective, but it is proposed that considerable scope remains for researchers to develop further bridges between the different theoretical perspectives. In particular, the bridge between the macro, strategic and individual perspective appear to offer a high potential for further research, particularly as firms grapple with their role and purpose within wider society and nature and even CEO's themselves calling into question whether the primary purpose of firms is simply to make profit for shareholders (Murray, 2019). As such, and referring back to the opening statement in this research, the only agreed-upon proposition we have today remains that we do not have a commonly accepted theory to explain how and why firms behave as they do (Wernerfelt, 2016). However, rather than moving closer to developing an accepted theory of the firm, it seems likely that as the questions related to the purpose and role of firms in society grow in importance, the theoretical discussions to understand firms, will amplify rather than contract, and the need to create bridges across the theoretical perspectives will only increase.

Putting aside the wider questions of the purpose of firms, considering the strategic level perspective, this research raises several discussions and ideas worthy of further research. For those researchers who currently rely on RBV as the underlying theory for their firm-level investigations, this research challenges the use of RBV and proposes the alternative ATBV developed in this research. In particular, the newly developed ATBV challenges the idea that all resources need to be investigated to understand firm-level behaviour and performance. Instead, this research argues, in line with the ideas of Penrose (1959), that availability of management time is the key resource that influences firm-level behaviour. Moreover, this research proposes that central management attitudes are the key influencers on how management time is used within the firm. As such, this research proposes that central management attitudes and overall management time are the two key factors to be investigated to understand firm-level behaviour and levels of growth, not all resources as outlined in RBV (Barney, 1991).

This proposal warrants further discussion and research from two perspectives. On one hand, if it is not accepted that only attitudes and time need to be considered to understand firm-level behaviour and performance, then there is considerable scope for future researchers to make the case for other factors that should be considered when investigating firm-level behaviour. Consequently, although it is recognised that management time and attitudes may not be the only key determinants of firm-level behaviour and performance, it is left to future researchers to investigate what those other, additional determinants may be, and also, investigate the level of influence of each determinant on firm-level behaviour and performance.

If, on the other hand, it is accepted that attitude and time are the key determinants of firm-level behaviour and performance, then there exists considerable scope to look for new ways to better capture and measure both attitudes and management time allocation to understand firm-level behaviour.

In terms of management time allocation, this research has highlighted this element as a key constraint, if not the key constraint that limits a firm´s growth. Thus, it is felt that an increased understanding of how management time is used is an area of research worthy of more exploration. It is noted that Porter and Nohria (2018) recently published research on how CEO´s spend their time, a research stream which aligns well with the research carried out here. Whereas Porter and Nohria (2018) focus on the CEO as an individual, this research suggests that the way

the CEO and the wider central management team use their time has a major impact on how other general managers in the firm use their time. It is felt that more research into the connections between time allocation amongst central managers and its impact on other general managers in the firm is a research topic worthy of further research.

Furthermore, it is proposed that further understanding of the trade-offs that firms and managers make when deciding where to use their available management time, either using their time on the existing business or on the development of new productive opportunities, is also worthy of further research. In particular, there are opportunities to investigate how those decisions on time are made and also the effect that those time allocation decisions ultimately have on firm-level behaviour and firm growth. This research has relied largely on qualitative analysis, but it is proposed that the new ATBV conceptual framework provides a basis for more quantitative minded researchers to measure and quantify the time spent in each area of the business, and how different amounts of time affect the performance of the firm. An intriguing question for example is, do those firms who dedicate a higher percentage of their management time on exploring new productive opportunities, achieve higher revenue growth at the expense of growing margins from the existing business? Alternatively, do those firms who dedicate a higher percentage of their management time to the existing business achieve higher margins, but at the expense of new revenue growth? Or, perhaps do those firms with higher margins have more management time available to look for more productive opportunities? Such questions relate closely to the notion of ambidextrous firms (Duncan, 1976). Although researchers have demonstrated that firms need to develop ambidextrous capabilities and find a balance between spending time on exploiting existing productive opportunities and time looking for new ones, the notion of ambidextrous firms remains largely conceptual. It is proposed that a deeper understanding how much management time is allocated to developing new productive opportunities and how much time is allocated to exploiting existing capabilities could help to further refine and understand the notion of ambidextrous firms.

In terms of further understanding the importance of management attitudes in determining management and firm-level behaviours, as pointed out by Southey (2011), the theory of planned behaviour (Ajzen, 1991), although widely applied to understand consumer decision making, has not been widely used to understand management decision making. It is proposed here that there exists considerable scope to apply the theory of planned behaviour (Ajzen, 1991) to further investigate and understand the rationale and reasoning for management decision making. The

development of the DISC score has created one means to investigate collective management decision making, but there remains considerable scope for future researchers to investigate management attitudes and its links to management decision making and behaviours.

Furthermore, this research has applied the ATBV conceptual framework and DISC scores to understand management attitudes towards a new productive opportunity, but in fact, there exists a wide range of possibilities to apply the framework to understand management attitudes and management decision making in other business areas. For example, understanding management attitudes towards important concepts such as sustainability, business ethics, innovation or operational excellence.

It is often stated that the key to the success of any such idea within the firm is “top management support” (Bradley et al., (2003), the new ATBV framework developed in this research opens up the possibility to research in-depth the antecedents to getting top management support. Using the ATBV conceptual framework as a means to research and understand central manager attitudes and gain an understanding of why a central manager may support one idea but not another, opens up an interesting field of yet unexplored management research. In this researcher´s view, it is no longer enough for researchers or managers to state that “top management support is key to success”, it is instead required that researchers delve into the attitudes and beliefs of these top managers, to understand why they may support one idea, but not another. For practitioners, this point is perhaps even more relevant. It has frequently heard from practitioners that an idea has failed inside a firm because of a lack of “top management support”. This seems like a deflection of responsibility of managers, who should be asking why top management does not support a particular idea. It is hoped that the ATBV framework provides practitioners with a new means to think about why top managers may support or not support a particular idea, and then to think about what managers can do to alter those attitudes. If central managers do not support an idea, but general managers believe that the idea is in the best interests of the firm, it is for general managers to convince central managers to adopt the idea by influencing their attitudes, not blaming central managers when they do not.

Lastly, for a thesis that purports to develop theoretical knowledge related to firms, one must ask what implications does this research have for the modern firm and for those that seek to investigate and understand firms? Such a large question requires big thinking, and one major challenge that could be directed at this research is the argument that firms should always seek to

grow. Raworth (2017) and Washington and Maloney (2020) put forward powerful arguments against continued and unrestrained growth. The authors argue for a need for economies (and firms) to grow within the constraints of specified ecological and environmental limits and not beyond. This research has taken the assumption that all firms need to seek to grow just to survive, but this research has not considered the alternative perspective of whether firms should ever seek to limit their growth? Is it the responsibility of firms to limit their own rates of growth, is it the responsibility of governments to place limits on firms, or can one leave it to consumers and the market to set limits on the rate of growth of firms?

Although these questions are not new (Elkington, 1998; Stahel, 1997), increasing concerns and visibility on the environmental and societal impact of large, fast-growing firms are already affecting the behaviour of firms and is likely to continue to do so increasingly in the future. As it does, one can expect that theorists who seek to understand the behaviour of firms will increasingly need to understand firm-level decisions in light of not just revenue and profit growth (as in this research), but also in terms of environmental and societal pressures that may constrain revenue and profit growth. It is proposed that if central managers who set the direction of firms need to widen their beliefs to also take into consideration the environmental and societal impacts of their decisions, then having a deeper understanding of the attitudes and beliefs of those central managers that do, and perhaps more importantly, those central managers that do not, could be essential to understanding firm level behaviour in the future. Understanding the attitudes of central managers towards the environment and societal impacts will be of particular importance for those who seek to convince central managers to change their attitudes and adopt more environmental and societally beneficial strategies. It is proposed that further development of the DISC model in this research, and particular a focus on personal and normative beliefs of central managers, could provide a useful starting point to understand the attitudes of central managers today, to allow policy makers and educators that want to change central managers attitudes and firm-level behaviour in the future.

Putting aside such big questions which delve into the realm of macro-level theories explained at the start of this thesis, and focusing purely on strategic level theories, many questions remain for modern-day firms. If, as this research argues, management time is the key constraint on firms, how should firms better make use of that time? This question is particularly relevant today, as technologies such as smartphones and virtual meeting software have allowed employees to work from anywhere at any hour (thereby increasing management time availability to firms). But on the

other side of this, there are increasing societal calls to reduce the number of hours that are spent at work (Alexiou and Kartiyasa, 2020; Kallis et al., 2013) with some countries reducing work hours, such as France's introduction of a 35 hour week for example. Such competing pressures are raising awareness about how much time individuals should spend at work and opens up interesting questions for firms about how much time they should expect from their employees and how can firms make the best use of the time available from employees.

Such questions about how firms should make best use of the time available from managers can be partially explored through the concept of ambidextrous firms (Duncan, 1976), and the idea that firms should seek to find the right balance between spending time innovating and developing new productive opportunities and exploiting already existing productive opportunities. The work of Birkinshaw and Gibson (2004) demonstrates the benefits of getting this balance right, but it remains a challenge for many modern firms to find the right balance. As a CEO of a large logistics company recently stated (company not specified for confidentiality reasons), "if I spent all of my time worrying about how new technologies and business models that may disrupt my business in the future, I would never get any sleep, We need to just focus on getting the job done today and let others worry about trying to disrupt the business in the future". However, one could argue that any CEO who is not looking forward to bringing in new technologies and adopt new business models, will not be in business for long. Because of the competing pressures on management time, considerable opportunity exists for researchers to delve further into this concept of balance and ambidexterity of firms and in particular understand how different firms manage time allocation differently, and if and how this can lead to different firm performance and behaviour. Furthermore, it is posited that the term ambidextrous may be limiting the thinking of researchers today in the context of modern day firms. The term ambidextrous implies an ability to manage the two topics of innovation and exploitation equally well. However, one could argue that finding the right balance between innovation and exploitation is not the only two topics that managers and firms need to balance. One could argue that firms and their managers need to find the right balance of their finite time allocation between many different topics, and not just the twin topics of innovation and exploration. One could argue then that for modern firms, it may be more appropriate to state that firms need to be multi-dexterous rather than ambidextrous, as firms seek to allocate the right management time to several topics all calling for management time. Future theorists could seek to understand for example how much time managers do spend, or should spend, with existing customers, looking for new customers, improving existing processes or products developing and

training employees, working with suppliers or even helping local communities. Such competing pressures require multi dextrous and not just ambidextrous capabilities.

In conclusion, although this research has aimed to answer the research questions set out at the start of this research, it has also generated several ideas and questions for future researchers to explore. It is only through further exploration of such questions that researchers can gain a deeper understanding of firm-level behaviour and performance. Unfortunately, if there is one thing nearly every manager and every researcher lacks today, it is time.

8 References

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9 Associated publications

Associated to this research, a number of related papers and book chapters have been written and published. All of these papers can be considered as intermediary or complementary to this research, but I confirm that this research contains only my work.

Publications in which I was the main author:

Lahy and Found (2015). Towards a theory of continuous improvement. POMS Conference Paper.

Lahy and Found (2017). Developing a Conceptual Framework for PSS business models. Procedia CIRP, IPSS Conference.

Lahy, Andrew, Ai Qiang Li, Pauline Found, Aris Syntetos, Mike Wilson, and Nicole Ayiomamitou. (2018) Developing a Product–Service System through a Productisation Strategy: A Case from the 3PL Industry. *International Journal of Production Research*, 2018, 1–17.

Lahy, Andrew, Mike Wilson, Daniel R Eyers (expected publication 2020). Setting up and then redistributing a 3D printing operation: Evidence from the industry. Chapter 12 of a Cardiff University Operational Research book, not yet published.

Publications to which I have contributed as a secondary author:

Found, P., Lahy, A., Williams, S., Hu, Q., & Mason, R. (2018). Towards a theory of operational excellence. *Total Quality Management & Business Excellence*, 1-13.

Eyers, Daniel, Andrew Lahy, Mike Wilson (expected publication 2020). 3D Printing for Supply Chain Service Companies. Chapter of a book on 3DP, not yet published.

10 Appendices