The effect of product integration on performance post acquisition:

Factors influencing the capture of value in the case of highly acquisitive firms in the business software industry.

An empirical study into firms' dynamic capabilities towards attainment of profitable product integration synergies post mergers and acquisition.

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Thesis submitted in partial fulfilment of the requirements for the award of Doctor of Business Administration at Kingston University

Declaration

I Pauline Olivia Parker declare that this thesis is my own work. The sources of all information, data and literature have been fully identified, acknowledged and cited as required.

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Abstract

Building on behavioural theory with dynamic capabilities, I have studied how firms create competitive advantage through innovation over time after multiple mergers and acquisitions. This research is focused on the acquirer's ability towards obtaining performance from product integration and set within the context of highly acquisitive software-houses, those organisations involved in the sales and manufacture of business software products.

Within high technology industries, resources are at the heart of the firm and constitute the largest cost. Dynamic capabilities are a more recently extended RBV of the firm to incorporate dynamic markets, I,e, firms in situations of rapid change. In these markets, where the competitive landscape is shifting, the dynamic capabilities by which firm managers integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. To this end, I test the dynamic capabilities theory in the high tech software industry in times of change.

In 2012, software firms completed over $66 billion of mergers and acquisitions (Berkery Noyes, 2013). However research suggests that synergies are often left unrealised (Barkema and Schijven, 2008; Léger and Quach, 2009). In addition, the software industry is maturing and the mergers and acquisition activity in the industry has intensified (Léger and Quach, 2009). The highly acquisitive company - seeking rapid growth and using acquisitions as the means to achieve this, is using a recognised route to growth (Damodaran, 2004). In a report from PwC (2014) Rob Fisher, the PwC US technology industry leader notes that

> *"With software embedded in virtually everything, software and Internet sector [mergers and acquisitions] deal activity continues to flourish, offsetting declines in other subsectors." (PWC, 2013):*

In this longitudinal research I describe, explain and account for the impacts of mergers and acquisitions on innovation, expressed through product integration; - the reconfiguring and combination of the product portfolios within software firms. Concerning the acquiring firm's endogenous growth (the creation of value through internal resource capability), I explain the relationship between organisation capabilities and the innovation outcome as well as the innovation effect on revenue.

I find that the dynamic capabilities framework is a suitable for complex empirical study. In addition I find that while the measures including the measured capabilities directly effect product integration and revenues. By using mediation techniques, I also find that revenues are indirectly affected by product integration. Interestingly product integration, negatively impacts the financial performance of the firm. These findings are important for managerial decision making and imply a high level of orchestration requirement.

According to the Business Software Alliance, BSA (2008), the software sector has enjoyed meteoric growth. In 2007, the software and related services sector experienced a real annual growth rate of 14%, while the business sector was considerably less. This is reflected by the business, SunGard (2009) who grew endogenously by only 1%. In light of the business problem, I concentrate on highly acquisitive software firms, i.e. those firms seeking growth through acquisition.

I conceptualise product integration innovation as a second stage process of organisation integration. I have tested my theory using panel data of highly acquisitive firms, which have undertaken in excess of 900 events over a ten-year period.

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Introduction

In this section of the thesis I will outline the overall context of the research. Firstly I will discuss why there is business problem to be examined by describing the background and motivation to the problem. I will explain and define the context of the research and clarify its importance to business and theory.

Business Problem - Background and Motivation

According to the Business Software Alliance, BSA (2008), the software sector has enjoyed meteoric growth. In 2007, the software and related services sector experienced a real annual growth rate of 14%, compared with a real annual growth rate of 2% for all US industries, outpacing the rest of the US economy in each year since 2003.

The highly acquisitive company - seeking rapid growth and using acquisitions as the means to achieve this, is using a recognised route to growth. Famously, Cisco went from being a small company in the 1990's to being (briefly) the largest market capitalised company in the world (Damodaran, 2004). High growth through acquisition is cheap, in part due to accounting rules that allow the acquirer to show the benefits of the acquisition but partially hide the costs of the acquisition. This growth success is reflected in the increase of share prices and marks out the CEO of the firm as a genius (Damodaran, 2004). The implication is, for the firm that has grown in this way to remain successful it has to continue on the acquisition path to keep the top-line numbers high. Léger and Quach (2009) agree and imply that in the short term, post acquisition, the firm can relax with regard to gaining product synergies by combining portfolios – simply making an acquisition increased the financial market value. In their study, Léger and Quach (2009) determine that for acquisitions within the software market, the financial markets fail to take the potential synergy of the combined software portfolio into account when valuing the acquirer firm's shares.

As this level of acquisition is not sustainable indefinitely, many of the highly acquisitive software houses such as SunGard (2010) have latterly attempted to focus on endogenous growth (PWC, 2013) from their existing portfolio. This is more generally termed as 'organic growth' in the industry, i.e. growing the business by creating and innovating more with what they already have (Nambisan, 2002a). In a press release in May 2009, Cristóbal Conde, SunGard president and chief executive officer, commented,

> *"We are very pleased that we achieved positive organic revenue growth in the quarter in the face of very challenging industry conditions"...'organic revenue grew just under 1% in the quarter' (SunGard, 2009).*

So how is it that the BSA (2008) reports that the software industry is growing by such a large margin (14%) but the internal growth of the example acquisitive software house is not? There is a possibility that the software houses are not looking at the revenue growth from increased innovation.

In this research I aim to describe, explain and account for the impacts of mergers and acquisitions on the impacts on innovation, in terms of product integration; - the reconfiguring and combination of the product portfolios in software firms. With regard to the acquiring firm's endogenous growth - I intend to explain the relationship between organisational capabilities and the innovation outcome as well as the innovations effect on revenue. In light of the business problem outlined, I intend to concentrate on highly acquisitive software firms, i.e. those firms seeking growth through acquisition.

Problem Definition

In 2012, software firms completed over $66 billion of mergers and acquisitions (Berkery Noyes, 2013). However research suggests that synergies are left unrealised (Barkema and Schijven, 2008; Léger and Quach, 2009). In addition, the software industry is maturing and mergers and acquisition activity in the industry has intensified (Léger and Quach, 2009). In a report from PWC (2014) Rob Fisher, the PwC US technology industry leader notes that

> *"With software embedded in virtually everything, software and Internet sector [mergers and acquisition] deal activity continues to flourish, offsetting declines in other subsectors."*
> By way of example, I have noted some of the largest deals from 2012 (PWC, 2014, p.1):

- Cisco's acquisition of NDS Technologies, a provider of content management software, for $5 billion.
- Dell's $2.4 billion acquisition of Quest Software, developer of application and database utilities.
- The $1.9 billion acquisition by RedPrarie, a developer of logistics management software.
- The acquisition of SunGard Higher Education from SunGard Data Systems by Datatel for $1.8 billion.

Léger and Quach (2009) explain that few businesses achieve the performance levels that were anticipated at the time the decision to undertake the acquisition was made.

Much research has explored the mergers and acquisitions process prior to acquisition and argues that strategic fit is key for synergistic opportunities (Barkema and Schijven, 2008; Hitt et al., 2009; Pennings, Barkema and Douma, 1994). Latterly however, Barkema and Schijven (2008) have revealed that although strategic fit is necessary, it merely creates potential for strategic realisation through effective integration.

As software is a high-technology industry (Nambisan, 2002a), the need for novel solutions has been a motivational strategy enabling firms to extend their resources and capabilities through mergers and acquisitions (Makri, Hitt, and Lane, 2010). Again, Makri, Hitt and Lane (2010) find that the pre-acquisition decisions on fit are important, however the level of the fit between the firms has an impact on innovation (creating novel solutions) in other high-tech businesses.

(Nambisan, 2002a) confirms that high-technology customers place increasing value on cross-product integration. On the other hand, this is challenging for the firm since integration efforts may cause distraction from the strategic product plans, additionally the potential disruption due to the need for additional development resources and rapid evolution of complementary products. This implies that post acquisition, in order to satisfy customer needs, the firm must innovate; - that is, combine and reconfigure their products to remain competitive and profitable (Teece, 2007).

Therefore, after an acquirer selects and then acquires a firm with synergistic potential, it is up to the acquirer to build the organisation in such a way as to facilitate the synergy opportunities, regardless of complexity (Barkema and Schijven, 2008). The performance of the acquirer in the financial markets is not impacted by the software compatibility (Léger and Quach, 2009), although there is a recognition that software firms are focusing on incorporating past strategic acquisitions, creating disruptive innovation and looking for competitive differentiators (PWC, 2013).

Within high technology industries, resources are at the heart of the firm and constitute the largest cost. The resource based view (RBV) of the firm is an influential theory that offers an explanation of assets that can be used in strategic change that achieves competitive advantage (Eisenhardt and Martin, 2000; Penrose, 2009). This RBV perspective is focused on the internal organisation and thus complements the notion the emphasis of strategy as positioning within an industry structure. More recently, scholars have extended the RBV of the firm to more dynamic markets, I,e, firms in situations of rapid change as the RBV does not adequately explain how and why some firms have an advantage in change situations (Eisenhardt and and Martin, 2000). In these markets, where the competitive landscape is shifting, the dynamic capabilities by which firm managers 'integrate, build, and reconfigure internal and external competencies to address rapidly changing environments' (Teece, Pisano and Shuen, 1997, p.516). To this end, the development of the dynamic capabilities framework sets out to enable business enterprises to create, deploy, and protect the intangible assets that support superior long- run business performance (Teece, 2007).

Dynamic capabilities are focused on the businesses that consist of difficult to replicate and trade assets and competencies such as the high tech software industry. In addition, dynamic capabilities include difficult to replicate enterprise capabilities required to adapt to changing customer and technological opportunities. Incorporating the ability to shape the ecosystem that it occupies, in terms of product development, business model design and implementation (Helfat and Peteraf, 2009; Teece, 2007).

Whilst the theory has extended the resource based view of the firm, theory concerning dynamic capabilities has had little time to develop, in relative terms and as such has been criticised for having a lack of clarity as well as a lack of empirical support (Helfat and Peteraf, 2009, p.92). Eisenhardt and and Martin (2000) use organisational theory to analyse the processes that underpin dynamic

capabilities. Helfat and Peteraf (2009) point out that a specific capability can be tested with the same tests as and resource based test in answer to critics.

Dynamic capabilities rest on the firms processs that can alter the current position leading to an effect on the firms performance and competetive advantage (Helfat and Peteraf,2009). The Teece (2007) dynamic capabilities model focuses in dynamic capability types, i.e. Sensing opportunities, seizing the opportunity and recombination. The dynamic capabilities basic chain of logic (Helfat and Peteraf, 2009, p.96) in Figure 1 demonstrates that subsequent to investement (seizing) the dynamic capabilities for recombination and reconfiguration can further alter the asset base leading to additional effect on firm performance. This is the fundamental problem to be addressed in this paper. After mergers and acquisitions, the opportunity sensed and seized by the firm, do the reconfiguration and recombination capabilities lead to increased innovation (product integration) and performance.

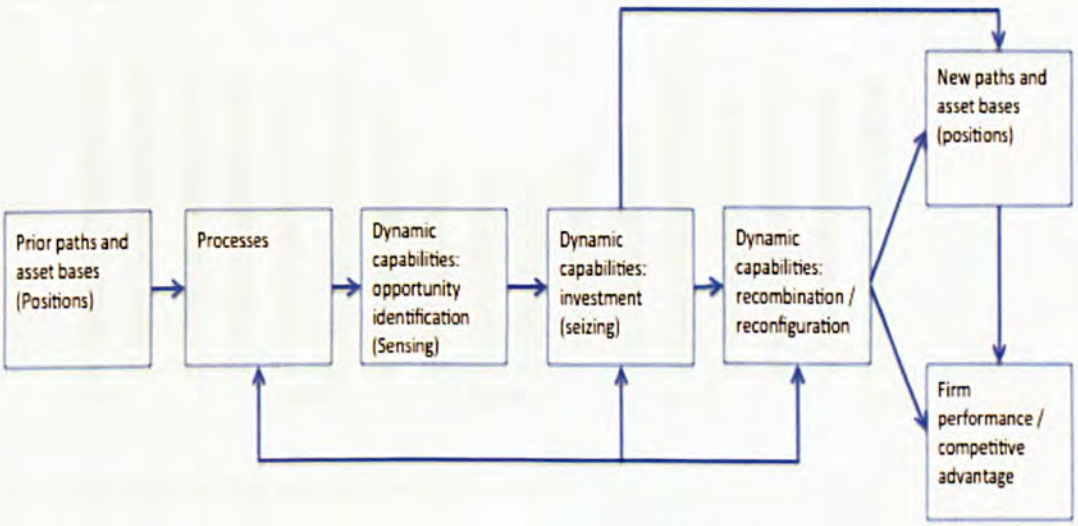


Figure 1 Dynamic Capability chain of logic (Helfat and Peteraf, 2009)

In light of the business problem and the reach of the dynamic capabilities framework. it is therefore reasonable to pursue the factors that determine the product integration innovation success of software products post acquisition as well as the impact of that innovation on the acquirer's performance. Thus extending the empirical work utilising this framework and adding to the body of work in strategy process incorporating management decision making, organisation routines and change.

Importance of the research

The timing of this research aligns with the emergence of the business package software industry from a cottage industry to be professionalised (Prasad and Prasad, 2002). It is now at a mature stage and major suppliers are no longer competing on minor features and functions. Mergers and acquisitions is one way to acquire gaps, those prominently missing features and functions; the firm then has only to assimilate them into their portfolio (Cloodt, Hagedoorn and Van Kranenburg, 2006).

In their report on the software acquisition market Grant Thornton (2011) confirm that mergers and acquisition are extensively adopted (Figure 2). The average deal value was $50 billion in 2010, with a $74 billion peak in 2007, undoubtedly reflecting the financial crisis of 2008.

Figure 2 U.S. software m&a activity (Grant Thornton, 2011)

Mergers and acquisitions in the software industry have been studied against measures such as market performance and accounting measures such as return on investments and shareholder value (Barkema and Schijven, 2008; Gates and Very, 2003; Léger and Quach, 2009). Technology performance is often measured by measuring patent generation (Ahuja and Katila, 2001; Cloodt, Hagedoorn and Van Kranenburg, 2006; Desyllas and Hughes, 2010; Makri, Hitt and Lane, 2010). The effects of packaged software product integration post mergers and acquisition have not been studied.

The highly acquisitive company that has used acquisition as a means to achieve growth reaches a point where investors are looking for endogenous growth (Damodaran, 2004; Prasad and Prasad, 2002). Within this paper, the context is to examine the effect on performance when the firm takes combined portfolios and innovates to reshape and therefore create new market offerings. In other words, to integrate the acquired products to satisfy customer requirements (Nambisan, 2002a).

A common research finding is that in general mergers and acquisitions fail to reach anticipated synergies (Barkema and Schijven, 2008). Conversely, research results in the field of technology mergers and acquisitions have shown that benefits can be achieved, for example:

- Barkema and Schijven (2008) find that restructuring gives long term benefits, although shareholders don't understand the gains from re-organisation.
- Léger and Quach (2009) find short-term performance losses. However they attribute long-term gains to virtual networks created only if the acquisition software is compatible
- Makri, Hitt, and Lane (2010) find that a difference in the technological knowledge acquired is key to invention achievement, producing high quantity, quality and novelty.
- Hitt et al. (2009) find that relatedness between the target and acquiring firms is important. Synergy is created largely by complementary capabilities, where complementary capabilities are different abilities that fit or work well together. While the integration of complementary capabilities is an important measure for success in acquisitions, much of the knowledge underlying these capabilities is tacit. Additionally, value to an acquiring firm can only be captured if the capabilities in the acquired firm are fully integrated into the acquiring firm.

These findings imply that performance benefits can be found post mergers and acquisition. Nonetheless there is not a clear explanation or recipe.

The software industry has entered a phase of maturity (Léger and Quach, 2009), and there are relatively few studies that specifically cover this industry. Moreover, there has not been a study that has considered product innovation characteristics as a factor in explaining performance of the acquiring firm after mergers and acquisitions.

Theoretical Framework

In this section of the thesis I will lay the foundations of current work on the theory and academic literature that contribute to my research. I will provide evidence of the main aspects of the literature that inform my work. I will structure the literature review with relevance to the business problem that is to be solved. Firstly I will explore the dynamic capabilities theory followed by the academic themes of knowledge management, appropriability regime, integration experience and business model.

Key Theories: Dynamic Capabilities Framework

This study is concerned with organisation capabilities and behaviours that impact the success or otherwise of product integration i.e. product innovation, post mergers and acquisition in the software industry.

Mergers and acquisitions (M&A) have been a topic of great interest in research regarding financial impacts as well as for organisational and individual behavioural effects (Ager, 2011; Ahuja and Katila, 2001; Barkema and Schijven, 2008). As Ager (2011, p.200) noted in an ethnographic study of Xerox, mergers and acquisition are difficult to do although " they seem like a good idea." Mergers and acquisitions are undertaken for multiple reasons, e.g. market growth, to gain economies of scale and scope and to acquire competencies (PWC, 2013). Domodaran (2004) explains that analysts like companies that engage in mergers and acquisitions and therefore invest heavily in them. Notwithstanding this, mergers and acquisitions are costly, complex, and risky. Many regard their potential worth the time and effort, yet, many fail to meet expectations (Barkema and Schijven, 2008; Léger and Quach, 2009). In the software market, Grant Thornton (2011) reports that mergers and acquisition are extensively adopted. Barkema & Schijven (2008) study the unlocking of potential synergies following mergers and acquisitions and build on a theme within behavioural theory that extends the insights into organisational learning, restructuring and acquisition behaviour. This research seeks to extend the body of existing research in organisation behaviours impact to product innovation following mergers and acquisitions and further, how the performance is mediated by the product innovation.

Post mergers and acquisitions, the most difficult job of the acquirer begins; the creation of value that was expected from the deal through successful integration of the companies' operations (Barkema and Schijven, 2008; Gates and Very, 2003). Whatever the acquirer's strategy, combining two firms will often constitute a challenging task for management. The acquirer must implement synergies in order to create value while simultaneously managing issues to avoid value leakage (Gates & Very, 2003). Barkema and Schijven (2008) agree that post acquisition, firms integrate to capture performance.

My study is not focused on the integration of the company operations, e.g. HR or accounts. It is concerned with the next stage of integration, involving innovation, resource management and organisation capability. Teece (2007) describes these requisite skills as dynamic capabilities and frames this activity stage in terms of the realignment of specific tangible and intangible assets. To this

end, my literature review is seeking extant research that explicates the influencing factors of post acquisition integration in the technology sector. These factors encompass wide ranging organisational influences associated with the decision to maximise value from an acquisition by realigning, integrating the portfolio and creating new product in the technology sector.

The dynamic capabilities framework, as explained by Teece (2007) is particularly relevant to high technology sectors, where company success depends upon the discovery and development of opportunities, the effective combination of internally generated and externally generated inventions, efficient and effective technology transfer inside the enterprise, the protection of intellectual property, the upgrading of 'best practice' business processes, the invention of new business models, making unbiased decisions, and achieving protection against imitation and other forms of replication by rivals. The software sector as described by Nambisan (2002) is the quintessential high technology industry. It is characterised by a high rate of product and process innovation, high knowledge intensity, rapidly shrinking product and technology life cycles, global markets and intense competition.

The dynamic capabilities concept addresses how to sustain a capabilities advantage in the context of strategic change (Helfat and Peteraf, 2009). Teece (2007, p.1319) opines that within fast-moving businesses open to global competition, depicted by dispersion geographically and organisational sources of innovation (and manufacturing); sustainable advantage requires more than the ownership of difficult to-replicate (knowledge) assets. The business also requires unique and difficult-to-replicate dynamic capabilities. These capabilities can be harnessed to continuously create, extend, upgrade, protect, and keep relevant the enterprise's unique asset base. For analytical purposes, dynamic capabilities can be disaggregated into the capacity (1) to sense and shape opportunities and threats; (2) to seize opportunities; and (3) to maintain competitiveness through enhancing, combining, protecting, and when necessary, reconfiguring the business enterprise's intangible and tangible assets. As this study is concentrated on the capabilities necessary following mergers and acquisitions, I will analyse the capability effects on performance of reconfiguring, enhancing, combining and protecting the firms assets, in other words, product integration.

I will explore whether, post merger and acquisition a firm improves performance through software innovation (not invention) - by combining and reconfiguring acquired products. In this context, invention refers to the development of a new idea and the establishing of property rights on that idea, for example by patents. Innovation, on the other hand, refers to the commercialisation of the invention (Makri, Hitt and Lane, 2010). Within this study, emphasis is on the creation of new product combinations and their subsequent commercialization, thus use of the term innovation rather than invention.

Innovation has become an increasingly important source of value creation in many industries (Makri, Hitt and Lane, 2010). The importance of innovation has been heightened by rapid technological

change and growing knowledge intensity in industries. Because of these factors, innovation must come faster and there is a higher need for novel solutions, especially in high-technology industries. Thus, firms have turned to mergers and acquisitions as an alternative strategy for obtaining the knowledge necessary to create innovations with the speed and the novelty necessary to either maintain a competitive advantage or to build a new one (Hitt et al., 2009). The rapid growth of technical knowledge in the past few decades has meant that building and maintaining expertise in multiple technologies is difficult for even the largest corporations. Thus the sheer volume of acquisition activity in the high-technology sector suggests that managers view acquisitions as a mechanism for accessing technology (Ahuja and Katila, 2001).

In the literature I reviewed with relevance to post mergers and acquisition strategy execution, the term dynamic capabilities became increasingly prevalent as a way to encompass the requisite organisation behaviours and skills, particularly in the technology sector. It was Augier and Teece (2009) that framed my chosen approach towards this study. They expose the manager's problem of thinking about strategy in a 'real world' business paradigm as opposed to a pure academic one. Augier and Teece (2009) explain that a manager works across multiple disciplines to make a strategic difference, for example within resources (for allocation and management) and economics (managing income and costs), whilst the literature tends to concentrate on each discipline separately. Teece (2007) asserts that the dynamic capabilities framework contains a richer description of features and factors than those that are contained in the Penrose (2009) resource-based approach. The dynamic capabilities framework pulls together many disparate literatures encompassing entrepreneurship, decision theory, organisational behavior, innovation and economics to identify the key classes of capabilities that firms must possess if they are to succeed in generating greater incomes over time (Augier & Teece, 2008, p.1190).

Dynamic capabilities

The seminal work underpinning the links of strategy, organisation behaviours and performance outcome is a paper from Teece (1986), a document that generates the ideas necessary to create a framework and is a precursor to the term dynamic capabilities. Dynamic capabilities are the behaviours required, particularly in a technology environment, by a firm in order to profit from innovation. Dynamic capabilities relate to the enterprise's ability to sense, seize, and adapt, in order to generate and exploit internal and external enterprise-specific competences, and to address the enterprise's changing environment (Helfat and Peteraf, 2009; Augier & Teece, 2008; King and Tucci, 2002; Teece and Pisano 1994; Teece et al. 1997). The possession of dynamic capabilities is especially relevant to multinational enterprise performance in business environments that are open to international commerce and are fully exposed to the opportunities and threats associated with rapid technological change (Teece, 2007).

In his analysis of profitable strategies, Porter (1980) discusses his Five Forces and recommends that the firm finds an attractive position in its industry. i.e. a position which is growing, has limited competitors and isn't exposed to pressure from buyers and suppliers. Porter (1980) extends this advise towards building defences (such as product differentiators) to shield from competitors. Augier and Teece (2008) find this approach insightful but limited and too product focused, with little attention given to the firm itself or to the management capabilities.

Management capabilities and the organisation's business model have been developed from Penrose (2009) over the last 50 years. In her theory of the firm, one way of looking at the organisation is as a collection of physical and human resources; as an administrative organisation with continuity within the history of the firm. In other words, the firm's name or owners, products produced, geographical location or legal form may change, but it is still considered to be the same firm and there is continuity. Penrose (2009) sees the business enterprise as possessing bundles of fungible resources, generated in part from its prior activities. These resources can be deployed to produce a variety of final products. Managers would endeavour to reconfigure the firm's portfolio of products to meet customer needs. Like Porter (1980), Penrose (2009) explains that profits would then flow from achieving differentiation with the addition of putting excess or unused resources to work. The resources approach provides another way of increasing financial performance. Profits can flow from the possession of scarce and difficult-to-imitate resources or knowledge assets, the services of which are in demand by customers. Augier and Teece (2008) assert that the Penrose (2009) resource-based approach is, like Porter (1980), limited. Augier and Teece (2008) find the framework rather static with little consideration given to how the firm would regenerate the sources of its success. While learning, particularly managerial learning, is embedded in the resource-based approach, the organisational (and individual) capabilities that enable the business to build and maintain value-enhancing points of differentiation are not.

The dynamic capabilities framework is to create, deploy, and protect intangible assets that support short and long-term performance. The Teece (2007) framework is built on a Penrose (2009) resource based approach to behavioural theory with organisational decision-making. That is, resource based theory is given the context of business enterprises consisting of portfolios of idiosyncratic and difficult-to-trade assets, competencies or resources. Within this framework, competitive advantage can flow at a point in time from ownership of scarce but relevant and difficult-to imitate assets, especially know-how. However, in fast-moving business environments open to global competition, and characterized by dispersion in the geographical and organisational sources of innovation and manufacturing, sustainable advantage requires more than the ownership of difficult-to-replicate knowledge assets (Augier & Teece, 2008; King and Tucci, 2002; Teece, 2007). Sustainable advantage also requires unique and difficult-to-replicate dynamic capabilities according to Teece (1990) in Teece (2007). These capabilities can be harnessed to continuously create, extend, upgrade, protect, and keep relevant the enterprise's unique asset base. The Teece (2007) dynamic capabilities are described

and contextualised in three discrete groups. 1, **Sensing**: to sense and shape opportunities and threats, 2, **Seizing**: to seize opportunities, and 3, **Enhancement**: to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets.

I have focused this research within the third section of the dynamic capabilities framework, **Enhancement**, represented in Figure 3. This is a post-decision study. The strategic decision to undertake a merger or acquisition has been made and executed i.e. sensed and seized in dynamic capabilities terms.

Enhancing, i.e. redeployment and reconfiguration may also involve business model redesign as well as asset-realignment activities, and the revamping of routines. The redeployment can involve the transfer of non-tradable assets to another organisational or geographic location (Teece, 1977, Teece, 1980). It may or may not involve divestments. Helfat and Peteraf (2003) suggest that capability redeployment takes one of two forms: the sharing of capability between the old and the new, and the geographic transfer of capability from one market to another. Both are possible, but neither is easy.

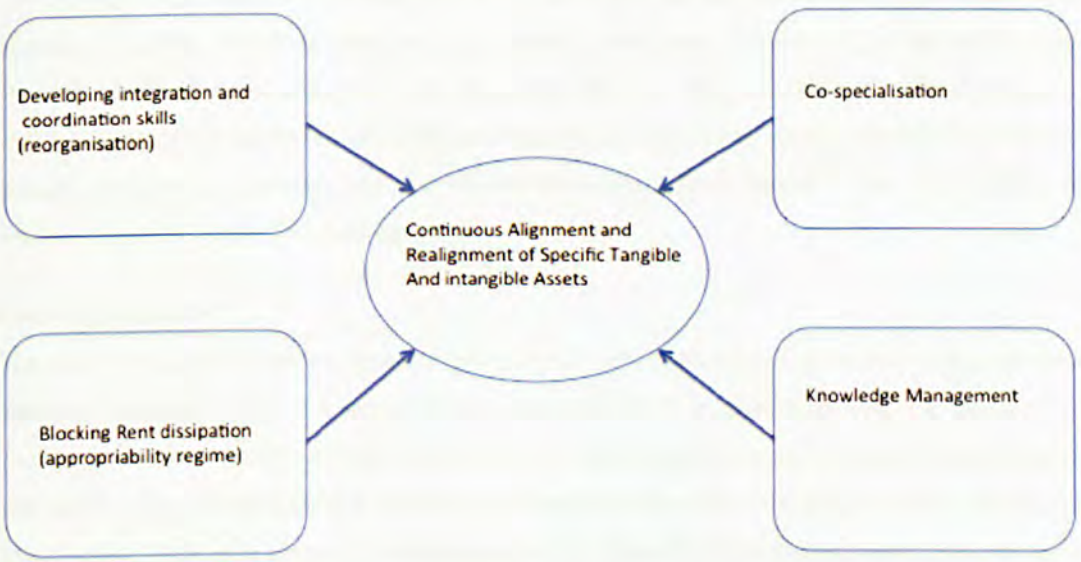


Figure 3 Enhancing: Combination, Reconfiguration, and Asset Protection Skills. Adapted from Teece (2007)

If the firm is to differentiate itself from its competitors, it must provide a product (or service) to its customers that is in some way superior to that of its competitors (Xu, Huang and Gao, 2012). Competitive success arises from the continuous development, renewal and reconfiguration of firm-specific assets. This is important. After an acquisition of a software company, the firm has acquired products as well as the people that have knowledge (tacit as well as documented) about the products; in other words, they have the difficult to replicate skills and capabilities. This means that, as with the Penrose (2009) approach that saw the business enterprise as possessing bundles of fungible

resources, generated in part from its prior activities, these resources could be deployed to produce a variety of final products. Managers then endeavour to reconfigure the firm's portfolio of products so as to meet customer needs. Profits then flow from achieving differentiation. I have chosen the description 'product integration', to explain the development of new product creation to satisfy customers, following mergers and acquisitions.

The dynamic capabilities approach is consistent with the view that emergence of new products and processes results from new combinations of knowledge and that processes of organisational and strategic renewal are essential for the long-term survival of the business firm. In technology sectors according to Teece (2007), the foundations of enterprise success depends upon the effective combination of both internally generated and externally generated inventions and innovations, efficient and effective technology transfer inside the enterprise, the protection of intellectual property, the upgrading of best-practice business processes, the invention of new business models, making unbiased decisions, and achieving protection against imitation and other forms of replication by rivals.

In high technology markets the integration of new products has become a strategic necessity – with customers placing increasing value on cross product integration (Nambisan, 2002a). Rather than Invention such as new patents, new product development. This study is concerned with the impact of the firm's capabilities to embed acquired knowledge in new goods and services (product integration), launch products and services into the market (innovation), and moreover, the firm's ability to increase revenues to the firm, following acquisition activity.

Product Integration

The term product(s) within this research relates to the end product(s) that are the final goods (and services) produced by the firm based on the utilisation of the competences that it possesses. The performance (price, quality, etc.) of a firm's products relative to its competitors at any point in time will depend upon its competences, which in turn depend on its capabilities (Teece, Pisano and Shuen, 1997, p.516). The term Product Integration is directly related to the transformation of the software product portfolio held by the firm, following mergers and acquisitions (Nambisan, 2002a; Léger and Quach, 2009). The extant literature on product development indicates that implementing incremental product changes is contingent on the flexibility of the product strategy and the development environment (Nambisan, 2002a).

The new combinations of products demonstrate ability to earn long-term returns. The management's ability to combine and reconfigure specialised assets to meet changing customer needs build long-run value. If an enterprise possesses resources and competences but lacks dynamic capabilities, it has a chance to make a competitive return for a short period; but it cannot sustain supra-competitive returns for the long term except through chance. "It does not earn those Schumpeterian rents

associated with 'new combinations' and subsequent recombination, or Kirznerian rents associated with bringing markets back into equilibrium" Teece (2007, p.1344).

The software industry is experiencing dramatic growth (Nambisan, 2002b). Grant Thornton (2011) explains that acquisitive software firms in 2011 are looking to build access to new customers and acquire innovative technologies. The ability to recombine and reconfigure the assets and organizational structures as the enterprise grows and technologies change is key to sustained profitable growth (Teece, 2007). Routines help sustain continuity until there is a shift in the environment. If innovation is incremental, routines and structures can probably be adapted gradually or in (semi-continuous) steps. When it is radical, such as after an acquisition, then there will be a mandate to completely revamp the organisation (Teece, 2007). The integration of each of these acquisitions requires considerable time and effort, thus often causing the burden on the acquirer's management to increase as its string of acquisitions grows (Barkema and Schijven, 2008; Penrose, 2009). Eventually, major organizational change may be needed to combine all the various pieces into an integrated network of operations suggesting that the role of organizational fit extends beyond the level of an individual acquisition (Barkema and Schijven, 2008).

Nambisan (2002a) argues that the adoption of proactive initial technology strategy critically determines the ability and intensity of a high-technology software venture to rapidly and efficiently integrate its product with complementary (where a complementary product is one that enhances the value of a central product when the two are used together by end-users) products. Teece (2007) also finds complementary innovation (and complementary assets) is of great significance, particularly in industries such as software, where, for example, business applications can be especially valuable to users if they can somehow be integrated into a single program suite.

Because of decision-making based on limited information, i.e. bounded rationality, acquirers are typically unable to optimally integrate acquisitions the first time around (Barkema and Schijven, 2008). Therefore, the acquisitions can be thought of as pliable, 'pieces of clay that firms attempt to mould' (Karim, 2006, p.804) repeatedly to unlock as much of their value potential as possible over time. Barkema and Schijven (2008) find that the post acquisition integration and restructuring cycles evolve over time, as a firm gains experience with acquisitions and restructuring, noting that it is quite common for firms to use organisational restructuring as a means of experimenting with structure to find more promising configurations (Barkema and Schijven, 2008; Karim, 2006).

According to the resource-based view of the firm, acquisitions are an important part of the business process of redeploying resources into more productive uses (Ahuja and Katila, 2001; Capron and Mitchell, 2009). Through acquisitions, firm-specific assets housed within one organization are merged with assets in another organization to improve the productivity of the combined assets (Ahuja and Katila, 2001). Evaluating the post acquisition performance of firms provides evidence on the efficiency of this asset-matching and combining process. I am relating acquisition characteristics and firm

capabilities to the innovation performance of acquiring firms' Innovation outputs – to be measured from the number of new products launched and number of product line changes made (Ahuja and Katila, 2001; Nambisan, 2002a).

The mediating effect of product integration

The capabilities discussed have thus far been directly associated with performance. However I would also like to understand whether, the success of product integration (innovation) in the highly acquisitive software firm has an impact on performance. And in which way the capabilities to create and configure new product makes the firm more money. In other words, I am looking for any evidence that the organisation's capabilities and behaviours have a direct relationship to performance; a direct relationship to product integration or whether the product integration influences performance indirectly.

These questions of whether and how the relationships of the organisation's dynamic capabilities affect performance and the intervention effect of product integration will be analysed using a mediation model as explained by Hayes (2013).

Performance

Performance in this study is financial and is defined as the firm's ability to generate revenue from their (output) products and echoes prior research measure of performance (Carrillo and Gaimon, 2000; Ireland, Reutzel and Webb, 2005). Secondly, as I am using annual reports from a single accounting country, it means that the revenue recognition accounting standards are measured in the same way and inform the capital markets as to the actual value of the highly technological company (Wagenhofer, 2014). Effects of time and firm size are also used to articulate revenue as an accurate measure of real growth (Weinzimmer, Nystrom and Freeman, 1998).

Companies that pursue growth through acquisition have a strong tendency to do well in the stock markets but use accounting techniques that show the benefits of the acquisitions but partially hide the source of the growth, i.e. the acquisition (Damodaran, 2004). Market prices and accounting ratios are often used as an assessment of a firms performance after mergers and acquisitions (Barkema and Schijven, 2008; Léger and Quach, 2009).

Within the software business, revenue is a key measure used to persuade the market, competition and the customers on the firm's strengths. In addition there are strict rules regarding revenue recognition for new software products as outlined by PwC (2009). For example, SunGard (2010) explains that their revenue is highly diversified by both customer and product. The software manager will generally be targeted on revenues for the products they manage and the firm will report on

these, for example, Oracle (2011) states they expect (and therefore measure) that software licence updates and support revenues will grow. Oracle (2011, p.3) also *"believe that an active acquisition program is an important element of our corporate strategy ... enhances the products ... grows our revenues and earnings"*. Teece (2007) agrees, explaining that revenue is a key measure in product planning, adding value to the customers that they will pay for. Therefore it is reasonable to use revenue as the most appropriate measure for performance.

As I am interested in the effect of product integration on performance, I can collect the total revenue as well as the revenue for software product (licence), software maintenance and software services.

Knowledge Management

As Léger and Quach (2009) point out, a software product is largely intangible in nature, based on knowledge, and has characteristics peculiar to its portfolio. After an acquisition, the two companies have to combine resources in order to achieve organisational integration as well as portfolio integration. The literature examined related to mergers and acquisition in knowledge worker intensive organisations draws heavily on knowledge systems and the management or integration of them (Augier and Teece, 2009; Cloodt, Hagedoorn and Van Kranenburg, 2006; Gates and Very, 2003; Grimaldi and Torrisi, 2001; Teece, 2007). Barney (1986) in Cloodt, Hagedoorn and Kranenburg (2006, p.643) determines that it is the firm's ability to acquire, transfer and integrate the acquired firm's knowledge base that creates a sustainable competitive advantage.

The act of acquisition is the beginning of a large project, the majority of which is the integration of the acquired firm (Gates and Very, 2003). The challenge is to create shareholder value while at the same time managing issues in order to avoid value leakage. The maturity of the industry largely determines whether the acquisitive company is to understand how to integrate acquired knowledge, achieve technology integration and understand the non-financial benefits of acquisition. On examining the integration of a firm post acquisition, Starkey, Tempest and McKinlay (2004, p.339) identify that there is a requirement to integrate the acquired firm's knowledge and use it towards competitive advantage. Barkema and Schijven (2008) agree and argue that as the initial integration post acquisition is suboptimal subsequent acquisitions decreases an acquirer's performance and therefore forces a reorganisation of the firm.

In his explanation of dynamic capabilities, Teece (2007) also finds that the ability to integrate and combine knowledge assets is a necessary capability in gaining performance. Following an acquisition, there is specialist knowledge within both the acquirer and the acquired firms, contributing to heightened levels of conflict. The ability towards coordinating, learning, product combining and reconfiguring is key to sustain long-term performance (Teece 2007). Teece, Pisano and Shuen (1997) propose three management leadership skills that are required to sustain dynamic capabilities, namely coordination/integration, learning and reconfiguring. Together they form an 'orchestration' process - an important managerial function is achieving semi-continuous asset orchestration and corporate

renewal. Teece (2007, p.1320) defines orchestration in the context of the management functions identified (coordination/integration, learning and reconfiguring) is analogous to that of a musical orchestra conductor, although in the business context the 'instruments' (knowledge assets) are themselves constantly being created, renovated, and/or replaced. Moreover, completely new instruments appear with some frequency, and old ones need to be abandoned. While flexibility is certainly an element of orchestration, the management capacity of orchestration as a concept implies much more.

The understanding of the basic business functions that make-up business administration and operations are understood (Teece, 2007). The organisation competencies can be nurtured by inter-organisation links within the organisation structure - necessary in knowledge intensive firms. In the technology sector, within a software house, a large body of the non-administration staff are the technicians, analysts and programmers. Echoed in an ethnographic study of the company Xerox, Orr (2006) found an inter-organisation disconnect where the organisation's managers did not really understand the work undertaken by the technicians. The knowledge workers domain is complex and that of a software developer means understanding the palimpsest of the product, the layers that have gone before him as well as putting on his own. The divestment of people at Xerox, and hence the management of knowledge was poorly managed, Orr (2006, p.1813) comments on the drive to expense saving within an organisation as often being short-sighted, 'management felt free to trade away functionality... for minor savings in expenses'. These actions uncovered by Orr (2006) point to poor capabilities with respect to knowledge management. The (dynamic) capabilities framework suggests to Augier and Teece (2009) that the scope of the manager includes resource selection decisions, but must also make reference to co-specialisation, or systems integration.

The most valuable assets inside the firm are knowledge related and thus non-tradable. The coordination and integration of such assets create value that cannot be replicated in a market. This establishes a distinctive role for managers in economic theory and in the economic system according to Teece (2007). Managers seek new combinations by aligning co-specialized assets. The need to reconfigure when change occurs requires the allocation, reallocation, combination, and recombination of resources and assets. These are the key strategic functions of executives. Indeed, skills used to identify and exploit complementarities and manage co-specialisation are scarce (Augier and Teece, 2009). Figuring out how to increase value from the use of people as well as products in the software business, (that the enterprise owns) involves understanding the granular detail of the firm's asset base, and filling in the gaps necessary to provide superior customer solutions. This is where gap filling may involve building new knowledge bases (assets), or disposing of assets (people).

Management can make big differences through investment choice and other decisions. The dynamic capabilities framework endeavours to capture the key variables and relationships that need to be 'manipulated' to create, protect, and leverage intangible assets to achieve superior enterprise

performance and avoid the zero-profit trap. However, building and assembling tangible and intangible assets and effectuating change are seen as difficult. Success over time is likely to require achieving necessary internal creative destruction, possibly involving divestments to help sustain superior performance Teece (2007).

Léger and Quach (2009) tested the antecedents of the performance of mergers and acquisitions of software firms on an event basis. They posit that the most noteworthy criterion is inherent in the intangible nature of software products. Essentially based on knowledge, the combination of software firms is associated with certain economic phenomena that are specific to the information technology industry and that emerge from the characteristics of the product portfolio. More specifically, Léger and Quach (2009) ask whether the financial performance of the firms involved in a software business combination is influenced by and results from the characteristics of the new entity's portfolio of software products. In line with this I have also selected to operationalise the Léger and Quach (2009) concepts of software compatibility and software complementarity as criteria to explain the performance effect of mergers and acquisitions of software firms.

In light of the discussions on creating value in a high-tech knowledge intensive industry after major changes, such as acquisition, I have selected five knowledge management areas to focus on. Namely:

- Compatibility: the acquisition of firms with compatible software products (Léger and Quach, 2009), and the capability to leverage product knowledge to integrate the products.
- Complementarity: the acquisition of firms with complementary software products (Léger and Quach, 2009), and the capability to leverage product knowledge to integrate the products.
- Competency: the acquisition of technical knowledge that is difficult to imitate or replicate (Léger and Quach, 2009), and the capability to leverage product knowledge to integrate the products.
- Divestment: the divestment of people due to the acquisition and the divestment of products capability towards creation of superior performance (Teece, 2007).

Knowledge management, **Compatibility:**
Software compatibility is defined as

> *"the extent to which programs can work together and share data. In another area, totally different programs, such as a word processor and a drawing program, are compatible with one another if each can incorporate images or files created using the other. All types of software compatibility become increasingly important as computer communications, networks, and program-to-program file transfers become near-essential aspects of microcomputer operation" (Microsoft, 2002, p.115).*

In the context of a business combination, if the products owned by the firms involved in the merger are compatible, this should reduce investments the new entity needs to make to market a unified product portfolio. In addition, software compatibility can be perceived as a benefit for customers since it allows the joint use of software and thus gives access to new functionalities without making any additional investments. In other words, in addition to conferring technical advantages, compatibility is directly related to financial investments: the more compatible the software products are, the lower the financial investments required to make them work together (Léger and Quach, 2009).

Within the capabilities framework, a key to sustainable profitable growth is the ability to recombine and reconfigure assets as the organisation grows. Software product integration is ostensibly a reconfiguring; a combination of two or more products to achieve a new product offering. This then is the innovation, the assessment of the markets, the reconfiguring of the technology and the evolution of something new (Teece, 2007, p.1335). This research is centred on the value to the firm from the specific innovation of product integration; in software business terms, organic growth (SunGard, 2010).

I will collect data on acquisitions where the software is compatible to the existing portfolio. I expect the compatibility of the products held by the new entity to have an impact on the performance of the firm and on product integration.

Knowledge management, **Technology complementarity**:
Software complementarity is defined as compatible programs that are based on the same standards and require few or no investments to make them work together (Léger and Quach, 2009). In post mergers and acquisition research of the software industry, Léger and Quach (2009) found that the performance of the acquisitions in terms of price/book value ratio is impacted positively when the portfolio acquired is technologically complementary to that of the acquirer. They also find the acquirer pays a premium for software portfolios that are compatible and complementary but the financial markets neglect the characteristics of the portfolio purchased. This implies that the lack of market attention may impact the product integration capability through lack of management / business drive.

In addition, Makri, Hitt and Lane (2010) found that too much technological similarity or too much difference reduces innovation when they investigated invention outcomes post mergers and acquisition on technology firms. However, based on their model on the relatedness of the acquirer and acquired firms, and the invention performance achieved, their findings show that the technology complementarity of the firms is a key to success. Whilst the Makri, Hitt and Lane (2010) knowledge measures distinguished between science and technology, the definition of knowledge complementarity is analogous - technological is how components are linked together and Scientific is the core design concepts and how they are implemented. Whereas Makri, Hitt and Lane (2010)

measure invention and not innovation their findings informs this study, since invention is required as a first step towards innovation - in order to gain revenue from it. The Makri, Hitt and Lane (2010) definition of invention is that which is unexploited in the marketplace - invention as the solution of a puzzle, an invention in a lab, and the process of recombination, re-combining in a novel way.

In a study on the unification and aggregation factors that have a positive effect on innovative performance of technology mergers and acquisitions, Cloodt, Hagedoorn and Kranenburg (2006) found that post mergers and acquisitions, the unification of two knowledge bases can provide opportunities for synergies in the firm's future research and development, whilst also reducing redundant or duplicate R&D efforts which can provide a larger research base to finance costs. An important factor in the merger of two firms is their relatedness in terms of particular fields of technology that the acquiring firm shares with the acquired firm, in other words their complementarity. Cloodt, Hagedoorn and Kranenburg (2006) identify two types of complementarity – one, the relatedness of the mergers and acquisitions in terms of the company products and markets concern the industry-aspect; two, on the technological complementarity (relatedness) referring to firm-specific aspects such as technological disciplines (computing infrastructure for example) and engineering capabilities (software languages for example).

From an organisational learning perspective, a positive effect lies in the ability to better evaluate and utilise complementary externally acquired knowledge rather than uncomplimentary externally acquired knowledge. This is based on the idea that a firm's absorptive capacity depends mainly on its level of knowledge in a specific field. If the knowledge base of the acquirer is not sufficiently adapted to the acquired knowledge, the absorption process becomes very difficult. Therefore, unrelated technologies often require a radical change, which can easily be counterproductive. However, technological knowledge and engineering capabilities that are too similar to the already existing knowledge of the acquiring company will contribute little to the post mergers and acquisitions innovative performance (Ahuja and Katila, 2001; Hitt *et al.*, 2009).

I will collect data on the complementarity of the products and technology acquired. I expect there to be a positive impact on performance and product integration when the acquired products are complementary.

Knowledge management, **Competency**:

The acquisition of competencies in the software industry is defined by Léger and Quach (2009) as the acquisition of technical know-how or specific technologies, which are difficult to imitate or copy and which would require a corresponding financial investment. Gammelgaard (2004) argues that access to competence (non-tradable, unique resources) is a motive for mergers and acquisitions. Ahuja and Katila (2001) agree that acquisitions are an important part of the business process of redeploying resources into more productive uses and through the acquisitions, firm specific assets housed within one organisation are merged with assets in another to improve productivity.

An early element of the dynamic capabilities framework point to the ability to reconfigure and protect knowledge asset competencies with the aim of achieving a competitive advantage (Teece, 2007). Léger and Quach (2009) posit that many prior studies, as well as financial literature, have analysed mergers and acquisitions with relation to shareholder value creation. One of the main performance antecedents identified by Léger and Quach (2009) in post-merger performance in the software industry, is the potential to acquire competencies. The acquisition of competencies has the goal of acquiring skills that are difficult to develop internally or would take too long, meaning that this factor may be crucial to the success of the new entity.

An important managerial function is achieving resource orchestration and corporate renewal. This involves achieving asset alignment, realignment, and redeployment. It is necessary to minimize internal conflict as well as to maximise competencies and productive exchange inside the firm. Redeployment and reconfiguration may also involve asset-realignment activities. Redeployment can involve transfer of the non-tradable resource competencies to another organisation or geographic location (Teece, 1977, 1980). Helfat and Peteraf (2003) suggest that competency redeployment takes one of two forms: the sharing of the competency between the old and the new firms (or product lines), and the geographic transfer of the competency from one market to another.

In fast moving business environments open to global competition, the orchestration capability often relies on owning the knowledge assets as well as to enhance, combine and reconfiguring the difficult-to-replicate assets (Augier and Teece, 2009; Grimaldi and Torrisi, 2001; Teece, 2007). Within a software firm, the products produced are referred to as creative (Grimaldi and Torrisi, 2001), and as such the acquired resources have a lot of tacit product knowledge – hence being difficult to replicate.

A key challenge for companies is not just to acquire knowledge bases (competencies) to expand the firm's existing knowledge base, but also to integrate the knowledge workers in order to improve the post-mergers and acquisitions innovation opportunities (Ahuja and Katila, 2001). Hitt *et al.* (2009) also warn that, post mergers and acquisitions, a positive innovation outcome is dependent on organisational learning (through repetition). Integration of the acquired competencies is key to knowledge management, and learning from the process aids selection of future acquisitions and improves future integrations, thereby giving greater success. The integration of a knowledge base that is of a relatively large size can disrupt existing innovative activities and render the different integration stages more complex, more time consuming and full of risks (Cloodt, Hagedoorn and Kranenburg 2006, p.644). Due to such problems, integrating a relatively large knowledge base requires additional resources to be devoted to integration activities, leaving fewer resources for the actual innovative endeavor (Ahuja and Katila, 2001). Thus, it is expected that with the integration of a relatively large knowledge base, fewer resources will be available for innovative activities, which has a negative impact on the acquirer's post mergers and acquisition innovative performance.

I will collect data on whether competencies were specifically sought after as part of the mergers and acquisition. I expect the acquisition of competencies to have a positive effect on product integration – neutral on performance.

Knowledge management, **Divestment**:

Divestments in the context of this study refer to changes in the scope of the firm (Barkema and Schijven, 2008) and the firm's capability towards divestment which is that of redeployment and reconfiguration and involves the firm's decisions regarding asset realignment (Capron, 1999; Teece, 2007). The assets under review are human and product, thus the definition of divestment is firstly, the human resources divestment (redundancy) that is directly attributed to merger and acquisition activity. Secondly, it is the product divestments (disposals) (Pennings, Barkema and Douma, 1994).

Divestments of products and people are used to demonstrate asset shedding and competency divestment. The freeing of dying systems and technologies allow for removal of innovation limitations arising from established frameworks (Teece, 2007, p.1335). Teece (2007) argues that divestments are necessary. Over time successful enterprises will develop hierarchies and rules and procedures (routines) that begin to constrain certain interactions and behaviours unnecessarily. This means that inertia and other rigidities stand in the way of improved performance. This in turn implies that, less well-resourced enterprises end up winning business.

In order to solve problems and avoid limitations in innovation, managers that divest assets may end up with a competitive advantage Teece (2007). Post acquisition, a firm may need to reorganise and reconfigure its people (assets) and also consider the products and boundaries of the firm that are no longer viable. Especially in a technological setting, the divestiture may be fragile and exiting the firm boundaries may not be obviously rational (Hitt *et al.*, 2009; Teece, 1986, 2007). Barkema and Schijven (2008) found that post acquisition, divestment activity (people and products) does tend to increase at time of organisation reorganisation and impacts performance. Divestments are part of the product portfolio restructuring and are common when there are major changes in the scope of a firm through, for example mergers and acquisitions. A regular occurrence in highly acquisitive firms, undertaking organisational restructuring refers to the recombination of existing company departments leaving the scope of the firm unchanged and are required to unlock synergies contained within the acquisition (Barkema and Schijven, 2008). In support of this, Damodaran (2004) found the divestiture rate of acquisitions rises to almost 50% of prior acquisitions made, suggesting that few firms enjoy the promised benefits from those acquisitions. The bottom line on synergy is that it is exists, or, is extracted in relatively few mergers and acquisitions and therefore often does not measure up to expectations

Within dynamic capabilities, Teece (2007) explains that an important managerial function is achieving semi-continuous asset orchestration and corporate renewal, including the redesign of routines. This is because the sustained achievement of superior profitability requires efforts to build, maintain, and

adjust the complementarity of product offerings, systems, routines, and structures. Inside the enterprise, the old and new must complement. If they do not, business units (products and people) must be disposed of. Capron (1999) finds that asset divestiture and resource deployment can contribute to performance.

Since the divestment of assets post acquisition is a common feature, and it may impact the firm's ability to create value with product integration, I will collect data on divestments of products. I will also collect data on any divestment of people that is directly attributed to acquisition, as opposed to divestment for cost cutting or due to organisation restructure.

I expect the divestments of product to positively affect performance and the divestment of people (with their tacit knowledge) to negatively effect the product integration.

Hypothesis 1

- How does the knowledge management approach of the firm impact the software product integration capability? The organisation restructure post acquisition increases knowledge through new networks (Léger and Quach, 2009), however the acquisition and organisation restructuring may limit capabilities to innovate (Augier and Teece, 2009).
    - H1a. The acquisition of compatible technologies through mergers and acquisitions has a positive indirect effect on the acquirer's performance through product integration.
        - The acquisition of compatible technologies through mergers and acquisitions has a positive direct effect on the acquirer's product integration.
        - The acquisition of compatible technologies through mergers and acquisitions has a positive direct effect on the acquirer's performance.
    - H1b. The acquisition of complementary technologies through mergers and acquisitions has a positive indirect effect on the acquirer's performance through product integration.
        - The acquisition of complementary technologies through mergers and acquisitions has a positive direct effect on the acquirer's product integration.
        - The acquisition of complementary technologies through mergers and acquisitions has a positive direct effect on the acquirer's performance.
    - H1c. The acquisition of competencies through mergers and acquisitions has a positive indirect effect on the acquirer's performance through product integration.
        - The acquisition of competencies through mergers and acquisitions has a positive direct effect on the acquirer's product integration.

        - The acquisition of competencies through mergers and acquisitions has a positive direct effect on the acquirer's performance.
    - H1d. The divestment of products post mergers and acquisition has a negative indirect effect on the acquirer's performance through product integration.
        - The divestment of products post mergers and acquisition has a negative direct effect on the acquirer's product integration.
        - The divestment of products post mergers and acquisition has a negative direct effect on the acquirer's performance.
    - H1e. The divestment of people post mergers and acquisition has a positive indirect effect on the acquirer's performance through product integration.
        - The divestment of people post mergers and acquisition has a positive direct effect on the acquirer's product integration.
        - The divestment of people post mergers and acquisition has a positive direct effect on the acquirer's performance.

Appropriability regime

The appropriability regime, as explained by Teece (1986) in a seminal work on profiting from technological innovation, governs the innovator's ability to capture profits generated by innovation.

Turning invention into innovation, i.e. appropriating value is perceived by Teece (1986) as an important gap in strategic research. Within this study, innovation is the product integration post acquisition, the reconfiguration of acquired and existing products to offer something new to the customer. In order to further describe the need for an appropriability regime, Ahuja, Lampert and Novelli (2013) point to the resource-based view (RBV) of the firm since it presents a compelling and straightforward explanation of the emergence and sustenance of superior performance originates a process or product that is both valuable and rare, i.e., valuable in the sense that it satisfies some consumer need and creates value; rare in the sense that it is not possessed by its competitors. If the firm has certain isolating mechanisms that limit its competitors' ability to imitate the firm's invention, then the firm thrives in its relatively uncontested space and generates rents. Yet, the reality of competition suggests that a more complex dynamic is at work; especially technology intensive ones, on at least two dimensions. First, in most industries, imitation is only one possible threat to sustained super-normal profitability; the other threat, perhaps even more significant, is substitution; the satisfaction of the same customer need through a different route or product.

The concept of the appropriability regime helps explain how income from innovation and sources of performance can be protected from competitors. In the Teece (2007) dynamic capabilities framework, the appropriability regime's strength is an indictor of competitive advantage, and therefore performance. Augier and Teece (2009) assert that it is only recently that economic growth theorists and development scholars alike have begun to recognise that the application of technology

and the development of institutions to protect property, control corruption, and advance the rule of law are critical to economic development and economic growth. To profit from technological innovation, Teece (1986) refers to the efficacy of the legal mechanism of protection and the nature of the firms' technology as an important dimension that governs their ability to capture profits.

With the evolution of knowledge within organisations' in the software industry, Grimaldi and Torrisi (2001) find that inter-firm collaborative agreements and appropriability of innovation affect the firm's knowledge evolution. Grimaldi and Torrisi (2001) assert that an important dimension of the software industry evolution is represented by the appropriability regime and that this changes over time as with the evolution of the underlying software technology. Prior studies show that in order to protect themselves, European software firms mainly rely on dynamic appropriability: lead time, continuous innovation and the possession of skilled personnel, as opposed to legal protection such as patents and copyright (Grimaldi and Torrisi, 2001; Xu, Huang and Gao, 2012). The uncertainty surrounding legal protection of software explains why many software firms rely on secrecy to protect themselves from imitation.

The packaged software industry is traditionally characterised by a low degree of legal appropriability, largely due to the intrinsic difficulty in disentangling innovative and protectable expressions of original ideas, such as an 'graphic user interface', from unprotectable ideas, such as an algorithm (Grimaldi and Torrisi, 2001, p.1428). Grimaldi and Torrisi (2001) go on to maintain that for this reason, copyright is often used in software as an alternative to patents. However, even copyright represents a weak instrument of appropriability in the case of software. There is ample evidence that the transaction and legal costs in protecting ideas is non-trivial. It can be claimed that sophisticated technologies have high complexity (and therefore appropriability) and are therefore by definition hard to replicate. It is argued that this level of protection may also be explained by the fact that software is a relatively young industry and therefore the extension of copyright to software products is relatively recent. In the US, a Software Amendment to the Copyright Act was introduced in 1980, while in Europe the European Commission issued a directive concerning the application of copyright to software in 1991. Moreover, although copyright does not require the disclosure of the source code, reverse engineering from object codes (machine codes) is technically possible (Grimaldi and Torrisi, 2001; Magee, 1977; Tylecote and Visintin, 2007)

Mergers and acquisitions give the acquirer access to products and resources. However, the integration of the acquired product creates a dilemma, requiring both initial investment and probably expenditure on research and development (R&D). As Magee (1977) points out, the large oligopolies have protection over sales prices to a large extent and can use this as a level of protection on legal expenses and also R&D expense. This price control potentially offers an explanation on the timings of the decision to integrate products and why there is a potential lack of appetite to invest on the product integration. The firm has paid for the product, it is highly technical and, by its very nature,

difficult to emulate. This leads to the dichotomy of appropriability – will the integration create something new that gives a future benefit to the customer and therefore value to the firm or was the acquisition simply a mechanism to set the market price of their products. Will the appropriability regime in place mean that the acquirer finds it difficult to justify the product integration investment?

The property rights environment within which a firm operates can be classified according to the nature of the technology and the efficacy of the legal system to assign and protect intellectual property (Teece, 1988). To simplify, a separation can be drawn between products for which the appropriability regime is 'tight' (technology is relatively easy to legally protect) and those for which it is 'weak' (technology is almost impossible or expensive to protect). Teece (2005) argues that if the appropriability regime is weak there is greater flexibility and therefore greater value creation opportunities. If tight then the firm is exposed to risk of loss to competition. Business practice in the business software market sector is mixed, some relying on legal systems and some on technology complexity. For example:

Cinedigm (2005, p.17) has a weak appropriability regime: "*We depend heavily on technology to operate our business. Our success depends on protecting our intellectual property, which is one of our most important assets... although we do not currently hold any copyrights, patents or registered trademarks*". Whilst Citrix (2011, p.14) has a tight appropriability regime: "*Our success is dependent upon certain proprietary technologies and core intellectual property. We have been awarded a number of domestic and foreign patents and have a number of pending patent applications in the United States and foreign countries. Our technology is also protected under copyright laws. Additionally, we rely on trade secret protection and confidentiality and proprietary information agreements to protect our proprietary technology*".

This study has the appropriability regime levels of protection grouped into two categories, weak and tight. Tight refers to the legal dimensions such as copyrights, patents and trademarks. Weak refers to the strategic appropriability regime including lead-time innovation, product complexity and business secrecy (Xu, Huang and Gao, 2012). Trade secrets in knowledge-based technology industries, the degree to which knowledge is tacit or codified may be the (weak) selected appropriability regime, as it can be an effective way to stop imitation from competitors. Weak (or strategic) appropriability regimes, on the other hand, seem to be a viable way to improve the effect of internal tacit knowledge on product development. Since codification of internal tacit knowledge is difficult and risky, strategic appropriability regimes play a more important role in the relationship between internal technology development and new product development. Strategic appropriability regimes such as lead-time advantages and complexity of the new product can more effectively prevent competitors from imitating if the knowledge is relatively tacit. Similarly, the importance of absorptive capacity, which is defined as a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability (Xu, Huang and Gao,

2012; Zahra and George, 2002). This absorptive capacity, which can be regarded as a type of strategic appropriability regime, can help firms sustain their competitive advantage. Thus, strategic appropriability regimes can improve a firm's new product innovation when the knowledge (especially tacit knowledge) is created inside the firm. However, in software product integration, the level of protection acquired, if tacit knowledge, must be acknowledged and protected for any efforts to be effective (Teece, 1986, 2007; Xu, Huang and Gao, 2012).

A survey conducted by Torrisi in 1990 referred to in Grimaldi and Torrisi, 2001, shows that European software firms mainly rely on dynamic appropriability (lead time, continuous innovation and the possession of skilled personnel) as opposed to legal protection (patents and copyright). However, the follow-up interviews conducted in 1997 indicate that legal protection, especially copyright, is becoming more and more important. These results probably depend on the declining uncertainty surrounding the legal protection of innovation in the software industry and the rising importance of software packages for European software firms (Grimaldi and Torrisi, 2001).

In light of this discussion, I would expect to find a tight appropriability regime to have a negative effect on product integration and a positive effect on performance post acquisition.

Hypothesis 2.

- How does the appropriability regime employed impact the ability to integrate software product post acquisition? The appropriability regime refers to factors such as intellectual property rights that give the firm the ability to capture performance (rents) from the integrations (Minniti, 2011; Teece, 1986; Winter, 2006).
    - H2. The appropriability regime post mergers and acquisitions has a positive indirect effect on the acquirer's performance through product integration.
        - The appropriability regime post mergers and acquisitions has a negative direct effect on the acquirer's product integration.
        - The appropriability regime post mergers and acquisitions has a positive direct effect on the acquirer's performance.

Integration experience

An acquisition is usually not an isolated event, but merely one part of an overarching sequence of acquisitions collectively aimed at implementing a corporate strategy (Barkema and Schijven, 2008). The integration of each of these acquisitions requires considerable time and effort, thus often causing the burden on the acquirer's management to increase as its string of acquisitions grows (Penrose, 2009). The crucial transforming organisation behaviour identified by Augier and Teece (2009) has been integration management by highly skilled managers and people with capacities to combine and integrate.

The firm is a repository of capabilities and knowledge (Augier and Teece, 2009; Penrose, 2009) and learning is central to its growth. In order to build profit, the firm builds on routines that are recurrent patterns of action. Seeking strategies based on improving performance, routines and processes evolve, becoming part of the firm's knowledge creation and learning.

Mergers and acquisitions add a new dimension to the firm. An argument posed by Barkema and Schijven (2008) is that even with pre-integration preparation, initial integration is nevertheless, suboptimal. As a result, acquisitive growth decreases an acquirer's performance, eventually forcing it to engage in organisational restructuring to more fully unlock the synergistic potential. The problem is expanded further over time and with acquisition propensity, particularly those acquisitions where the rationale for their selection has been scale, scope or transfer of capability. In studying the effect of multiple acquisitions in conjunction with the number of reorganisations over time, they have shown that organisation change is used to increase performance.

More recently, however, Barkema and Schijven (2008) assert that the bulk of the research attention has shifted toward a second contingency that arises in the post acquisition, or implementation, stage of the acquisition process: organisational fit. The argument is that, although strategic fit is a necessary condition for synergy realisation, it merely creates value potential that can only be realized through effective integration of an acquired firm. Moreover, integration enhances acquisition performance. Hence, after an acquirer selects and acquires a firm with synergistic potential, it is up to the acquirer to unlock as much of this potential as possible by building sufficient organizational fit. However, this is a complex task that requires considerable management time and attention. The integration of each of these acquisitions requires considerable time and effort, often causing the burden on the acquirer's management to increase as its string of acquisitions grows (Penrose, 2009). Thus suggesting that the role of organisational fit extends far beyond the level of the individual acquisition (Barkema and Schijven, 2008).

A key theme of behavioural theory is that repeated tasks are routinised (Augier and Teece, 2008); Barkema and Schijven (2008) assert that the restructure 'routine' is necessary to gain synergies. Reorganisation is common after a major event such as an acquisition. In an ethnographic study of a software firm, Ager (2011) noted that this was not an extraordinary exercise. It was done, in order to realize the synergies sought by the deal.

Barkema and Schijven (2008) maintain that because of the number of acquisitions a firm makes and the subsequent reorganisations that it undertakes, there is a corporate learning which makes the task increasingly routinised. In turn this lowers the demands on the firm's management due to increased experience rather than through bounded rationality, meaning that a firm has "limited information, attention, and processing ability" (Greve, 2003, cited in Barkema and Schijven, 2008, p.697). An acquisition is usually not an isolated event, but merely one part of an overarching sequence of acquisitions collectively aimed at implementing a corporate strategy.

In terms of product integration, the strategic, organisational, and human resource decisions made by management are at the heart of enterprise performance. Success requires that managers behave in an intensely entrepreneurial manner and build into their organisation the capacity to transform and reconfigure as opportunities and competitive forces dictate. Such capabilities, if built, constitute the dynamic capabilities required. Not many CEOs have the necessary skills, and fewer still succeed in building them into their businesses. The dynamic capabilities framework developed in the field of strategic management highlights the growing importance of entrepreneurial management (Augier and Teece 2009).

In light of the literature I have reviewed, within a highly acquisitive software firm, I expect the number of acquisitions made to impact the organisation experience. I also expect to find that the organisation learns from their post acquisition experience in the form of organisation restructures, thus affecting the performance of the firm, particularly in the subsequent year(s).

Hypothesis 3

- How does the experience of merger and acquisition impact on the firm to reconfigure the products? There is evidence that following mergers and acquisitions, firms that reorganise and restructure have better returns, however in the longer term there needs to be an ability to reconfigure the resources to sustain rents (Augier and Teece, 2008; Barkema and Schijven, 2008).
    - H3. Organisation restructuring has a negative indirect effect on performance through product integration.
        - Organisation restructuring has a negative direct effect on the acquirer's product integration.
        - Organisation restructuring has a negative direct effect on the acquirer's performance.

Business Model

In this study, the term business model is used to describe a plan for the organisational and financial design of a business, which makes valid assumptions about the behaviour of revenues and costs, and likely customer and competitor behaviour. It outlines the contours of the solution required to make money. Once adopted it defines the way the enterprise 'goes to market'. Selecting, adjusting and/or improving the model are likely to be critical to commercial success. It involves distilling insights to customers, suppliers, competitors, and the marketplace in general (Teece, 2007). I have used the co-specialisation aspect of the Teece framework to encompass the business model. In 1986, co-specialisation was described by Teece as the ability to generate profits from the firm's know-how, both codified and tacit. In almost all cases, the successful commercialization of an innovation requires that the know-how in question be utilized in conjunction with other capabilities or assets. Services

such as marketing, competitive manufacturing, and after-sales support are almost always needed. These services are often obtained from complementary assets, which are specialised. Later this became known more as asset orchestration. As part of the 3rd stage to the dynamic capabilities framework in this study, the capabilities are to maintain competitiveness through enhancing, combining, protecting and when necessary, reconfiguring assets. They also embrace the firms capacity to design and implement viable business models (Augier and Teece, 2009; Pierce and Teece, 2005; Teece, 2007, p.1319-1320).

The business model explains:

- How the revenue structure of a business is to be 'designed' and if necessary 'redesigned' to meet customer needs. This includes changes to the sales locations and changes to the sales channels such as adding on-line capabilities or using agents and partners.
- The way in which technologies are to be assembled. For example distributed manufacture over multiple locations.
- The identity of market segments to be targeted. This includes the client type, such as financial, not for profit or education as well as the target market for the product, such as asset mangers.

The function of a business model is to 'articulate' the value proposition, select the appropriate technologies and features, identify targeted market segments, define the structure of the value chain, and estimate the cost structure and profit potential (Chesbrough and Rosenbloom, 2002).

Teece (2006) reflects that the product/services architecture, and the business model, define the manner by which the firm delivers value to customers, entices customers to pay for value, and converts those payments to profit. It is the firms assumption about what customers want and how it can go about meeting those needs, getting paid well for doing so, and hopefully avoiding losing out to imitators. Business model choices involve market segments to be targeted, customer types, sales channels, product features and revenue capture methods (Teece, 2006; Chesbrough and Rosenbloom, 2002).

Working through an example of IBM who changed business model by changing their value proposition after the acquisition of a services firm, Agarwal and Helfat (2009) argue that strategic renewal is the driver for mergers and acquisitions to acquire knowledge and gain investment. The element of strategy is the impact on the business long-term and the renewal is due to the refresh of the business. Teece (2007) guards against changing the business model too often, however he agrees that the long term performance of the firm does not rely on scale or scope alone. For success, the business needs to constantly hone new products and business models. These will enable the firm to stay ahead rather than being shackled to the past.

The issue that the firm faces is not just when, where, and how much to invest, it should also select or create a particular business model that defines its commercial strategy and investment priorities. Teece (2007) asserts that there is considerable evidence that business success depends as much on organisational innovation, that is to say, the design of business models, as it does on the selection of physical technology.

I will collect data for the number of changes to the business model, which is to include the target markets, customer types and revenue capture methods. I expect business model changes to effect product integration and performance.

Business Model, **Locations**:

Through mergers and acquisition activity, the acquiring company may alter the geographic scope of the firm, which tends to affect firm performance (Hitt et al., 1997). The company may gain efficiencies resulting from the expansion of the scope (Léger and Quach, 2009) and the dynamic capabilities required are heightened because the global economy has become more open and the sources of invention, innovation, and manufacturing are more diverse geographically and organizationally (Teece, 2000).

Augier and Teece (2009) rationalise that today, firms compete in an increasingly global marketplace where creating, owning, and managing intangible assets is very important. Battles for customers and talent are continuous. The liberalisation of trade and investment regimes worldwide has served to sharpen competition in those regions exposed to global competition. The global dispersion in the sources of innovation requires enterprises to take a global approach to the innovation process.

Resources are at the heart of the resource-based view (RBV). They are those specific physical (e.g., specialized equipment, geographic location), human (e.g., expertise in software development), and organisational (e.g., superior sales force) assets that can be used to implement value-creating strategies (Eisenhardt and Martin, 2000). Teece (2004) argues that the economic value of knowledge depends not just on its ultimate utility, but also on the case of transfer and replicability. If it can be replicated, it can be 'scaled' and applied in new contexts. Replicability is closely related to transferability. If it can be transferred from one geography to another, or from one product market context to a different one, then technology can potentially yield more value. But the catch is that if it can be readily transferred, it is often also prone to being lost to competitors through easy imitation. (Barkema and Schijven, 2008) measure geographic scope with a count of the number of countries, noting that changes in geographies affect the firm's performance post mergers and acquisition.

Creating an operational or financial synergy is most commonly given as an explanation for an acquisition strategy. The operational synergies to increase income and growth include growth in new markets, combination of different strengths, and the economies of scale that may arise from the merger, allowing the combined firm to become more efficient and profitable (Damododaran, 2004).

Economies of scale constitute a classic motivation for mergers and acquisitions (Brouthers et al., 1998, cited in Léger and Quach, 2009; Damododaran, 2004; Eisenhardt and Martin, 2000). Combining into a new entity makes it possible to reduce average costs by consolidating production, as well as administrative, commercial, logistical and research and development services. Economies of scope emerge when it costs less for the new entity to produce different varieties of products, primarily because of the consolidation of purchases, advertising and distribution, which are now done on a larger scale (Priest, 1994, cited in Léger and Quach, 2009; Teece, 2007). Thus, economies of scope are one of the main reasons for marketing strategies such as the combined sale of products, the sale of related products or the sale of products under a single brand name. Market growth suggests a gain in market share and an improvement in competitive positioning. This concept also integrates the notion of increased market power, that is, a firm's ability to better control the prices, quantities or nature of the products it sells (Eisenhardt and Martin, 2000).

In waves of mergers and acquisitions during the late 1990s and early 2000s, the number of cross-border acquisitions has increased greatly (Hitt et al., 2009). The rationale for these acquisitions are that they broaden the reach of firms and allow them to effectively enter and/or enrich their competitive position within international markets. While cross-border acquisitions may reduce certain types of costs, they still must overcome the costs associated with the liability of foreignness in the host country; this includes knowledge about the different culture, area regulations, and the pervasive business norms of the location. Acquisitions help to overcome this liability because the acquired firm ought to have the local knowledge needed, assuming that the acquiring firm can capture this knowledge in making the acquisition (Eden and Miller, 2004). Research by Zhu, Hitt, Eden, and Tihanyi (2009) discussed in Hitt et al., (2009) found that acquiring firms are likely to create more value when the firms acquired are based in countries with lower risks. In particular, firms are better able to achieve synergy when the institutions of the host country are more similar to the institutions in the acquiring firm's home country. Clearly, however, firms based in developed countries that acquire firms in emerging market countries commonly transfer knowledge stocks to the firms in the host country. This is likely to benefit the firm in the host country more than the acquiring firm, unless the newly acquired firm can be effectively integrated into the acquiring firm (Kostova & Zaheer, 1999, cited in Hitt et al., 2009). The acquiring firm is more willing to transfer these knowledge stocks because they have acquired the firm's assets and thus control the use of this knowledge. Obviously, assert Hitt et al. (2009), integration is a critical element and is more complex and challenging.

Thus, geographic scope tends to affect performance and innovation (Hitt et al., 2009; Teece, 2007; Barkema and Schijven, 2008). I will collect data for the number of countries used for manufacture, i.e. software development and the number of countries used for revenue capture, in other words sales.

Hypothesis 4

- Does the business model of the firm impact the software product integration? There is evidence that reconfigured product gives the firm no advantage if the business model is not able to take advantage of it (Pierce and Teece, 2005).
    - H4a. The number of countries used for software development has a negative indirect effect on performance through product integration.
        - The number of countries used for software development has a negative direct effect on the acquirer's product integration.
        - The number of countries used for software development has a negative direct effect on the acquirer's performance.
    - H4b. The number of countries used for sales has a positive indirect effect on performance through product integration.
        - The number of countries used for sales has a positive direct effect on the acquirer's product integration.
        - The number of countries used for sales has a positive direct effect on the acquirer's performance.
    - H4c. The number of changes to the business model has a positive indirect effect on performance through product integration.
        - The number of changes to the business model has a positive direct effect on the acquirer's product integration.
        - The number of changes to the business model has a positive direct effect on the acquirer's performance.

Outcome influencers: Post mergers and acquisitions

Research and development Capacity

It is common in studies measuring annual sales to incorporate the firm size and expenditure on research and development (R&D) (Wooldridge, 2009). Within the computer software market the expenditure on R&D is lauded as money well spent, for example Temenos (2011, p.6) links R&D expense directly to product success:

> *"A further reflection of our commitment to product innovation, underpinned by the highest R&D spending in the industry, Temenos was the recipient of several product awards in 2011".*

Whilst software is often seen as a craft or creative activity, firms require efficient techniques for production and innovation for the customers (Grimaldi and Torrisi, 2001). R&D projects involve an exchange of a great deal of technical knowledge: of tacit and codified knowledge embodied in designs, standards, user requirement specifications, development tools, documentation, and object code (Grimaldi and Torrisi, 2001).

Post acquisition analysis suggests that firms with larger amounts of complementary technological knowledge undertake larger amounts of R&D (Helfat, 1997). Analogously, Powell et al. (1996) in Eisenhardt and Martin (2000) in found that knowledge creation processes that included external linkages led to superior R&D performance within biotech firms. This infers that the acquired, external linkages make for effective R&D knowledge creation.

The unification of acquired knowledge bases can provide opportunities for synergies in R&D, while reducing R&D can provide efficiencies (Cloodt, Hagedoorn and Van Kranenburg, 2006). Repeated actions, such as acquisitions, mean that some acquirers possess a superior absorptive and financial capacity that make them relatively more successful in carrying out acquisitions. The absorptive capacity (organisational learning) benefits show that the acquirer is better at picking firms to acquire, at stopping duds, exploiting the acquisition resources, building capacity and exploiting potential for innovation. However, the more acquisitions that are undertaken, the more that resources will be stretched. On the issue of synergy achievement, the KPMG (1999) evaluation of the 700 largest deals from 1996 to 1998 concludes that cost-saving synergies associated with reducing the number of employees are more likely to be realized than new product development or R&D synergies. For instance, only a quarter to a third of firms succeeded on the latter, whereas 66% of firms were able to reduce headcount after mergers.

These results suggest that acquisitions bring about a negative effect on both R&D intensity and R&D productivity, in particular in the first year following an acquisition. This is contrary to other findings but the organisation size may also be a reason for the difference. (Barkema and Schijven, 2008; Desyllas and Hughes, 2010).

When looking at the factors that benefit an organisation in increasing the absorption of knowledge and finance in a large unbalanced panel study, Desyllas and Hughes (2010) found neutral to positive effects of acquisition on R&D-intensity and negative to neutral effects of acquisition on R&D productivity - taking high technology acquirers in aggregate over three post-acquisition years.

Acquisitions can affect both innovative inputs and innovative outputs. For example, a firm's R&D expenditures can decrease after it conducts an acquisition as the firm eliminates certain streams of research or as managers become more risk averse (Hitt et al., 1991). Yet, even while research efforts decrease, the productivity of those efforts can increase as the two hitherto separate research teams combine their skills and knowledge (Ahuja and Katila, 2001).

In line with research from Ahuja and Katila (2001) into innovation performance post acquisition, I will collect data on the R&D values and include it as a statistical control as I expect it to have an impact on the tests within this study.

Organisation Size

As discussed, when measuring annual sales it is common to incorporate the firm size and expenditure on research and development (Wooldridge, 2009).

In 1988 Dans likened the organisation to a structure of atoms – built on energy and information, not steel (cited in Giddens, 1998). There is also a view that size matters; the smaller, speedier more innovative companies make it hard for the larger company to compete. Since the 1990's large corporations have contracted and de-centred; an example of this is Asea Brown Boveri that has been broken into 1200 different organisations (Giddens, 1998). Magee (1977) gives a different view on this and in examining multinational corporations finds that innovation and invention comes from smaller firms because they are more concentrated and therefore see higher returns proportionately to R&D investment. The larger firm is already competitive and therefore naturally spends less. It is therefore about maturity as well as size and scale. Angwin, Cummings and Smith (2007) describe the same phenomena from an economic perspective. The organisation that undertakes activity of acquisition in order to enjoy economies of scale becomes part of an oligopoly – essentially the industry coalesces in order to create differentiation options. This industry stage is particularly apt when the underlying industry reaches maturity. Economies of scale create the options for innovation and thus price making.

As described in the literature reviewed, the software sector is profitable and firms are growing by acquisition. In terms of product integration there is a potential influence with relation to organisation size. Barkema and Schijven (2008) note that the firm's size might influence the acquisition and performance behaviour. The complexity of larger firms may mean more restructuring or lead to inertia. Hitt et al. (2009) explain that the impact of firm size on acquisition performance likely results

from the effectiveness of the integration process, with integration being more difficult for larger acquisitions. They also assert that research findings for firm size are more consistent than for many of the other variables. The capability and drive for a very large firm to invest in the necessary levels of development are diminished in the face of competitive impact and increased revenues if the current literature is generalisable to this industry.

I will collect data on the number of employees as an indicator of firm size as used in prior research (Barkema and Schijven, 2008; Nambisan, 2002a) and use it as a statistical control.

Product Scope

Product scope affects firm performance (Barkema and Schijven 2008). Additionally, within the software sector the codification of knowledge is conditioned by the complexity of the organisation in terms of scale and scope (Grimaldi and Torrisi, 2001). When firms grow and enter new markets, their organisational structure is put under pressure. Moreover, when products are complex and innovative activities require different types of scientific and technological knowledge, firms have to mix their internal competencies, knowledge and experience with acquired sources of knowledge (Grimaldi and Torrisi, 2001; Teece, 1986).

As this research concerns software, I will count the number of software products the firm has in its portfolio. I will also count the number of target markets that the software house sells to. The target markets are an indicator as to the product specialisation areas (departments) requiring management within the firm. These data give a statistical measure to control for the scale and scope of the software organisations' range (Barkem and Schijven, 2008, Teece, 2007).

Number of Related Acquisitions

This study is concentrated on firms that are using mergers and acquisitions for growth and are thus highly acquisitive. As reviewed, organic growth does not come easily to companies. Damodaran (2004) explains that for a firm to grow, it has to not only find a number of new investments but these investments have to pay off quickly. Firms that are in a hurry to grow tend not to wait for this payoff to occur. Instead, they try to grow by acquiring other companies. Since they can fund these acquisitions by issuing new stock, there is no real limit (other than what the market will bear) on how many acquisitions these firms can make or how quickly they can grow, especially in buoyant markets. Small companies adopting this strategy can very quickly become large companies, and in the process, may make their investors wealthy. However, to obtain longer-term sustainable growth the firm needs to adopt the capabilities to combine, reconfigure and protect their assets (Augier and Teece, 2009; Teece, 2007).

As an acquisition is usually not an isolated event, but part of an overarching sequence of acquisitions collectively aimed at implementing a corporate strategy, an acquirer tends to face a sequence of integration decisions over time. Barkema and Schijven (2008) assert that each consecutive acquisition adds inefficiencies to an acquirer's organisational system while also putting pressure on the manager. Given bounded rationality, acquisitions are typically handled individually, rather than according to a preconceived, integrated strategy resulting from some formal planning system. Additionally, due to volume, changes in performance and innovation could be attributed to the firm's product integration activities, post acquisition, irrespective of the drive to acquire knowledge bases, products and so on undertaken (Hitt, Hoskisson and Kim, 1997).

Thus I will collect data on the number of mergers and acquisitions undertaken and use it as a statistical control.

Research Aims

The literature review has informed the study questions resulting in a conceptual model (Figure 6).

The model will enable the research to describe, explain and account for the effect of product integration on the firm's performance. Moreover, it will examine the effects that impact ability of the acquiring firm to achieve product integration post acquisition.

Figure 4 outlines the dynamic capabilities framework within which this research is set. Building on prior work, Teece (2007) proposes that within fast-moving business technological environments open to global competition, and characterised by dispersion in the geographical sources of innovation and manufacturing, sustainable advantage requires more than the ownership of difficult-to-replicate knowledge assets. Furthermore, these environments require unique and difficult-to-replicate dynamic capabilities. These capabilities are to be harnessed to continuously create, extend, upgrade, protect, and keep relevant the firms asset base. For analytical purposes Teece (2007) recommends the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets.

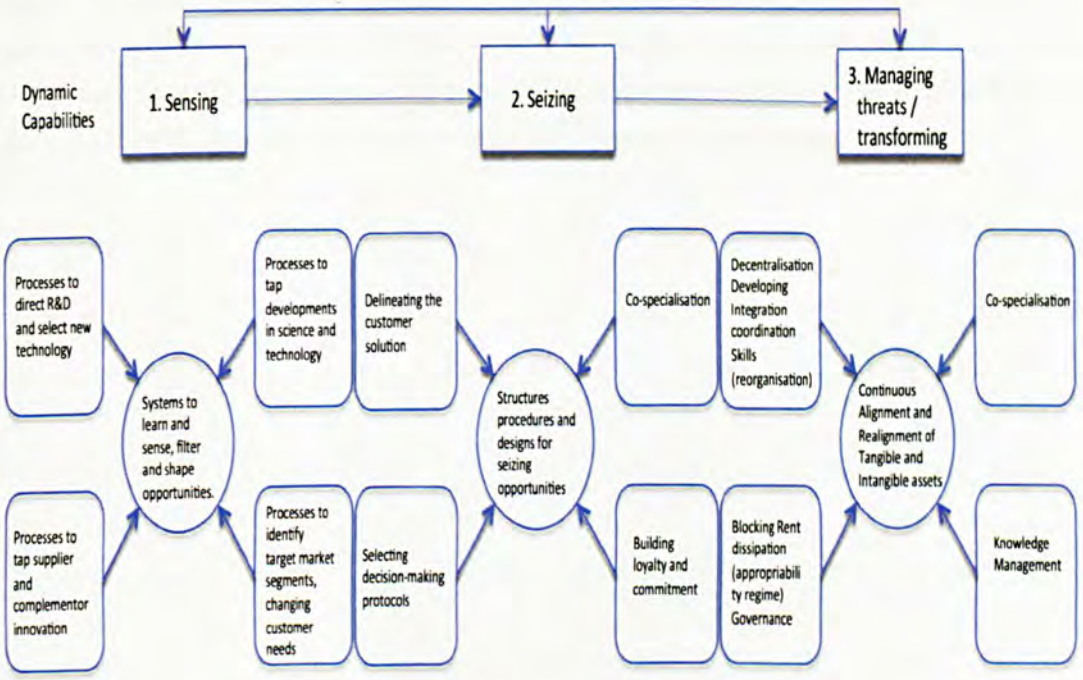


Figure 4 Foundations of dynamic capabilities framework. Adapted from Teece (2007)

The nature of this research is primarily set within the dynamic capability framework's third stage ('enhance / reconfigure'), in other words, the post mergers and acquisition decision and action event. With this study I am interested in heavily acquisitive firms as acquisition intensity has significant impact on the organisation learning activities, performance outcomes and portfolio scope (Barkema and Schijven, 2008). In practice, public software firms that are highly acquisitive are competing in

larger markets and need to recombine and reconfigure to maintain competitive (Damodaran, 2004; Nambisan, 2002a; Teece, 2007). Prior research has explained that highly acquisitive organisations are able to learn through repetition of routines and processes. However implementations may be limited as more acquisitions are added because the managerial resources are increasingly tied up (Augier and Teece, 2009; Barkema and Schijven, 2008; Léger and Quach, 2009).

After an acquisition, firms integrate to gain performance. With this study I claim that a further stage is required towards attaining performance, which is to integrate the acquired software products. My research theory will be tested with panel data of acquisitive software firms that have made multiple acquisitions over a decade. Prior research has often used either a single event as the unit of analysis (event driven) or has highlighted change over one, two or three years (Barkema and Schijven). In line with prior research, I have determined, that a (longitudinal) ten year dataset is sufficient (Ahuja and Katila, 2001; Barreto, 2009; Cloodt, Hagedoorn and Van Kranenburg, 2006). A longitudinal study of firms is required to explain the extent to which software firms reconfigure and recombine, i.e. that product integration happens and the product integration has an effect on performance.

Concentrated on dynamic capabilities within organisational behaviour theory, the research question centres on the factors that impact product integration post mergers and acquisitions and whether the performance potential from a software product acquisition is enhanced with or via Product Integration. The ability to realign and innovate will increase performance over the long term (Pierce and Teece, 2005). How is the performance of the firm impacted by the product integration?

Methodology and Methods

In this section of the thesis I will provide an overall research design built on a theoretical base. I will explain the elements of design, my philosophical stance, how the data is to be selected and a database created. I will then describe the methods for the analysis and the operationalisation of those methods.

Introduction

The method adopted for this research is based on the processes described by Sekaran and Bougie (2009) as a systematic and organised effort to investigate a specific business problem. The process is outlined below in Figure 5.

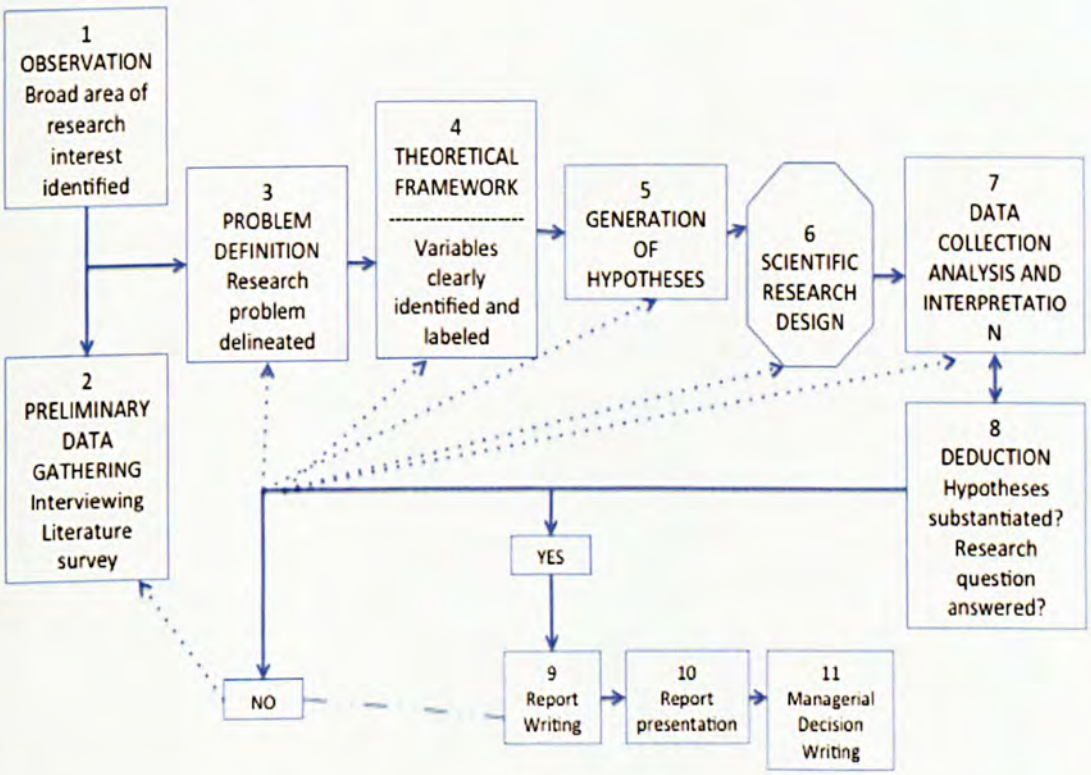


Figure 5 The research process (Sekaran and Bougie, 2010)

I will first outline the research problem and purpose. By undertaking an initial literature review I am able to narrow the broad problem area and define the hypotheses to be tested. Following this I will be able to create a conceptual model and create a design to facilitate the creation of measures to be used to test the hypotheses.

Having determined how to measure the variables I will collect the data that forms the basis for the analysis. In the analysis stage I will use statistical analysis to see if the hypotheses are supported and report the results.

Lastly I will interpret and discuss the results of the data analysis and make recommendations based on the findings (Sekaran and Bougie, 2010).

In other words I will formulate a model from theory, test the model against the data and determine how well the empirical test of the model conforms to theoretical expectations using statistical significance of the coefficients. (Heck, Thomas and Tabata,, 2014). Where further explanation is required I will describe the magnitude of the unstandardised coefficient.

This model facilitates my research towards describing, explaining and accounting for the effect of product integration on the firm's performance. Moreover it will examine the effects that impact the ability of the acquiring firm to achieve product integration post acquisition.

Design

This explanatory research is seeking to determine how a set of independent variables affects dependent variables and to estimate the effects of each independent variable (Heck, Thomas and Tabata, 2014).

Prior studies conclude that technology firms' acquisition and subsequent organisation integrations are complex and time consuming, (Barkema and Schijven, 2008; Cloodt, Hagedoorn and Van Kranenburg, 2006; Desyalls and Hughes, 2010). After acquisition, firms integrate to gain performance; this study claims that a further stage towards attaining performance is to integrate the software products acquired. I want to study the phenomena over time, gathering data longitudinally. This method is recognised to help cause and effect type studies as well as being able to offer good insights into a research topic (Sekaran and Bougie, 2010). Thus, the research theory will be tested with panel data of software firms who have made multiple acquisitions over a decade. I will use a fixed effects model regression analysis of observed panel data to test the direct relationships in line with prior research (Barkema and Schijven, 2008; King and Tucci, 2002). And as explained by Hayes (2013), Preacher (2014), and Wooldridge (2009), I will used a Simple Mediation Model to test the indirect effects.

The research is designed to explain the nature of the relationships of a set of independent variables to a set of outcome variables through hypothesis testing. It is concerned with the impact of phenomena over time, which means a longitudinal research design approach is required. The data collection will be both archival and historical and therefore non-contrived. The archival research strategy employed in this study involves using documents originally prepared for another purpose and is therefore unobtrusive (Bryman and Bell, 2007; Saunders et al., 2007). The original documents used in this research are the company annual report and accounts, which are prepared at the end of each financial year to communicate information to shareholders and financial records of firm stock market performance. The documents used in my archival research are a record of historical information that represents real observations over time. This information would be difficult to gain access to in any other way. Other approaches such as a case study strategy was considered but rejected due to the requirement to observe a large sample population with minimal manipulation. The data required are available in the organisation's annual reports and the financial press.

There is structured data for the company statistics and performance available within the archived annual reports. For the non-financial data - for example counts of countries used for sales, I will undertake a content analysis. Content analysis is a much used, very transparent and objective research method allowing for a longitudinal analysis with relative ease (Bryman and Bell, 2007). In order to assess the characteristics of the portfolio acquired, I will also undertake historical research. The historical research is to be based on the financial press, the acquirer's own press releases and updates within the acquirer's annual reports. Using a similar coding approach to Léger and Quach

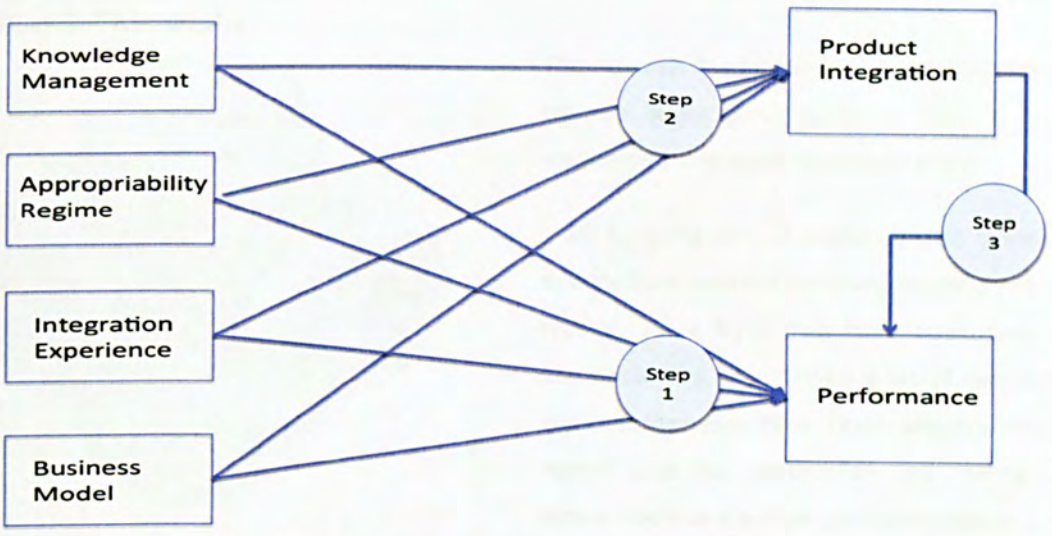
(2009) and based on Larsson (1993), this qualitative approach will allow me to code and measure the unstructured data. Bryman and Bell (2007) suggest that this unobtrusive, flexible approach is an important method for the cultural study of organisations because it facilitates analysis of the firm's values, which are contained with the organisation's documents and, by measuring their frequency, can discern their importance.

In keeping with the aims of the research, the data collected will be acquisitive in nature – for example, divestment of people will be selected only when the divestment of the people is attributed directly to an acquisition.

Replicability should be present in longitudinal research but it depends to a great extent on the data collection method and access to data required to replicate the study. The archival research strategy used in this study is likely to enhance replicability since the data are documented and available for other researchers to access and therefore repeat the study and its findings.

As the data will be collected over a period of time and therefore longitudinal, I will exploit the time dimension of the subjects to control for the unobserved variables. Using fixed effects on panel data and interacting with time dummies will enable me to express how the effect of a constant variable changes across time. In addition I will be able to determine the increasing or decreasing effect over time while keeping the overall effect fixed (Reichstein, 2014).

The conceptual framework (Figure 6) illustrates the basis of the hypothesis to be tested, namely the relationship of the firm's capabilities to performance (1), the relationship to product integration (2), and the mediated relationship of the firms capabilities to its performance via product integration (3). As I want to measure organisation behaviours on the performance of the firm, I will use the Firm as the unit of analysis as opposed to the mergers and acquisitions event in line with prior research (Barkema and Schijven, 2008). Product integration success will be measured by product portfolio extension (Nambisan, 2002a).



Step 1, Direct effect on performance
Step 2, Direct effect on product integration
Step 3, Indirect effect on Performance through product integration

Figure 6 Conceptual Framework

Research Philosophy

Figure 7 Research philosophy

This research is a repeatable, describable and testable study using published data, thus employing a deductive research strategy.

I will be using sets of published data taken directly from selected company accounts and reports. These have then been categorised and utilised to demonstrate a set of events and outcomes over time. These data are the reality used for observation and testing. Hence, I believe the base ontology is that of a realist. I believe the overriding assumption to be that of Conceptual Realist because:

- I have assumed that I can access and therefore observe what exists – i.e. US public companies that have engaged in acquisition over a ten-year period.
- The analysis and reasoning of the data leads to the results and is available to anyone.

Blaikie (2009) explains that the conceptual realist approach lends itself to the selection and testing of a researcher's concepts and ideas that will lead to the confirmation of the reality they have outlined. Consequently I will only discover answers to the concepts outlined, thus giving a narrow serendipitous view of the reality of the effect of acquisition for an acquiring firm. As noted by Blaikie (2009, p.41), "through a trial-and-error process, we can see the social world as it really is". Thus, the ontology is that of a conceptual realist. The relationship between a set of explanatory variables and performance is investigated in keeping with a positivistic approach. The positive nature of this study is initially characterised by the research purpose, which is to examine the association between opportunities behaviours framed by dynamic capabilities (Teece, 2007) and financial performance, mediated by product integration. Positivism is an epistemological perspective that assumes you can uncover what truly happens in an organisation by scientific measurement and that reality can be described without any loss of meaning or bias. The positivist approach, adapted from physical and hard sciences, generates hypotheses and tests these against the data to see if they are accepted. In this way statistical theoretical models are generated explaining the reality. Positivism considers knowledge of social science to be developed in accordance with scientific methods. I intend to use logic and mathematical analysis to make judgements and claim to answer the questions raised within a rationalist epistemology (Blaikie, 2009; Bryman and Bell, 2007; Collis and Hussey, 2008, Hatch, 2006). Figure 7 is a visual representation of my research philosophy.

Data Selection

The study is targeted on product integration, post acquisition in software firms that get revenues from the sales and maintenance of software products. I need a cohort of companies that are active in acquisition events. And in line with prior research in this area, I want to use archival data in the form of the company's annual reports. In order to extract data from the annual reports it is important that the contents are produced to a consistent standard. Private companies do not have to give their annual report to the general public, and as such are not readily available. This means that I will select public companies that produce annual reports to a domicile's standard and that are in the public domain.

The country of domicile for the firm is also a consideration in that I need to be able to read the annual report in my native language; therefore I want an English-speaking domicile. Preliminary checks on some European reports and these are mixed, i.e. German reports are sometimes in English if the company is international but in German if primarily domestic.

I then need a sample size that will be sufficient for the research design. Early research on mergers and acquisitions focus on the short to medium term, however, later research has found that innovation and organisation behaviours are not manifest in the very short term. The strategic decision to make an acquisition is conceptualised as a series of decisions taken over a number of years rather than a preconceived complete plan (Barkema and Schijven, 2008). Thus, as I want to measure the impact of organisation behaviours on the firm, I need data for at least three years. To this end, and in line with prior research, I will collect data covering ten years data and I will exclude firms that have been trading for less than four years. The selection of years 2003 to 2012 is to be selected.

As it is the highly acquisitive company seeking rapid growth and using acquisitions as the means to achieve it (Damodaran, 2004) and those companies need to combine the acquired portfolios to achieve long terms growth (Léger and Quach, 2009; Nambisan, 2002a; Teece, 2007), I will collect data for highly acquisitive software firms.

To ensure that I collect data relevant to software-houses I need to search for an appropriate company classification. Companies are classified by their type of economic activity for use by governments and financial markets. A large number of studies targeting an industry use the Standard Industrial Classification (SIC) code as an identifier. The SIC is a system for classifying industries by a four-digit code. Established in the United States in 1937, it is used by government agencies to classify industry areas (ONS, 2014). The code is useful if the primary interest is 'technology' but not granular enough to find a specific aspect of technology. I want to find business that has Software, as it's primary business activity this means that the SIC is not appropriate.

The financial markets use other sets of industry classification standards for their research and they are available via the Bloomberg terminal. I used Bloomberg to explore whether these alternate codes are more appropriate for my study than the SIC for the company data identification.

I found that the Global Industry Classification Standard (GICS) has a better, more complete categorisation for my needs and contains all the relevant software firms; I have therefore decided to use it for my data source.

By selecting firms via the GICS - in the years 2003-2012 in the UK there were 13 software firms with more than five acquisition events and in the USA there were 63. Each domicile (country) follows a specified and unique reporting requirement; I have therefore decided to concentrate on the USA as it has more data. This in turn means that the format of the annual reports will be in English and as the United States Securities and Exchange Commission (SEC) administer the filing and reporting, they will be consistent in their content and layout.

Thus the resultant data selection made is for: companies with the GICS sub industries category for application software and systems software, who have completed mergers and acquisition events in the date range of 01/01/03 - 12/31/12 (by mergers and acquisitions completion date), and that are domiciled in the United States.

Data Collection

As discussed, the data choice is US domiciled companies in the GCIS category of software with completed deals within the date range 01/01/2003 - 12/31/1012.

I created a pivot table of the full list of company names, with the company name as the row and the deal type (acquisition / divestment) as the column. In order to study firms that engage in acquisition. As this research is concerned with highly acquisitive software firms, I then filtered the firms to include only those who had more than five merger and acquisition events within the ten-year period (Barkema and Schijven (2008, p.710) found a difference at about six mergers and acquisition events). The result was 63 named firms. On data analysis I found that some of the firms selected were not suitable for the study and reduced the list further. The reason that firms were removed from the study included: Unnamed firm (1), Shareholders (management acquisition) (1), firms that had stopped trading (2), moved into another business type (5) or had been trading for less than four years (4). The resultant list of firms to be used is 50 giving 481 data rows. The reason for 481 rows rather than 500 (50 firms x 10 years), is that some firms had either not been trading for the full ten years and in one case the firm had changed their reporting practices and had missed one year which means that there is interval censoring for this one case. i.e. where an annual report for a year is unavailable, the row is not included. The complete list of firms is included in the appendix. On average the sample firms had 6,078 employees and revenues of $2,562,810. Furthermore they undertook an average of 2 acquisitions in any given year collectively engaging in 948. Not all firms included have been public for the full ten years; consequently this is an unbalanced panel data set, as described by Garson (2013), a cross-sectional time series data where the same subjects are measured in each time period.

Database

I have downloaded a PDF version of the annual reports for each of the fifty companies for each year 2003 – 2012. The annual reports are in the public domain and found in the investor relations section of the companies own website as well as on the Securities and Exchange Commission (SEC) website where the reports are filed, called a 10-K. I created a folder for each company with a copy of each of the available year's (2003-2012) annual report. I also contacted each of the companies to inform them of my research. Most of the companies sent a hard copy version of the annual report.

The data for non-financial variables were collected by content analysis - examining the text within the annual reports that are therefore an unstructured data source. This meant that each firm for each year was treated as a case and the documentation was used as if for an in depth review. For example:

- The *Number of Products Divested* count the number of named products: ACI (2006, p.7) stated, *"On September 29, 2006, we completed the sale of the eCourier and Workpoint product lines to PlaNet Group, Inc."*

- The *Nr organisation restructures* count the organisational restructuring events: Oracle (2006, p.80) stated, *"During the third quarter of fiscal 2005, management approved and initiated plans to restructure both the pre-merger operations of Oracle and PeopleSoft to eliminate certain duplicative activities, focus on strategic product and customer bases and reduce our cost structure."*
- *New Products launched:* Adobe (2003, p.4) *"Available in two versions (Standard and Premium), the Adobe Creative Suite is a complete design solution that provides efficiency through improved product integration, a new innovative file management tool call Version Cue, and powerful Adobe Portable Document Format ('PDF') workflow capabilities."*

For the three variables, acquisition of competencies, compatibility and complementarity I also used an historical research approach in line with Léger and Quach (2009) to determine their composition at the time of the decision to merge and to assess the characteristics of the new entities' software portfolios. This historical research was based on a survey of articles published in the press at the time each merger or acquisition was announced that described the makeup of the software portfolios of the parties involved. Using ProQuest (the information firm that supports the global research community), I chose to collect announcements of mergers and acquisitions in specialized publications such as The Wall Street Journal, Dow Jones & Company, the Financial Times, and any other relevant newspaper articles that captured information concerning software portfolios at the time of the announcement.

For the operationalisation of the variables, five (compatibility, complementarity, competency, divestment of people, appropriability regime) are coded as zero (0) or one (1). Seven variables (nr products divested, nr organisation restructures, nr countries for development, nr countries for sales, nr of business model changes, nr new products and nr changes to product line) are coded as a count of the number of items identified. Product integration is made up of nr changes to product line plus the nr new products. NB: the coding sheet operational definition is detailed in the appendix.

The coding is undertaken by two coders in the same location, with approximately one third of the coding being evaluated by both coders. Any variances are discussed and recoded by consensus, as recommended by Larsson (1993) and coding sheets was shared as employed by Leger and Quach (2009), again, detailed in the appendix.

I created a database in Microsoft Excel with a row for each year for each firm and a column for each of the independent variables and supporting data for those variables. This means that each company (my unit of analysis) has as many rows as there are time periods collected. I collected the values for each of the variables and stored them in the Excel database. These are double checked by a colleague in order to invoke a 'four eyes principle' regularly used in business for due diligence. On completion, the dataset is imported into IBM SPSS (SPSS).

Database Variables

Dependant Variables

Product Integration

This variable is a count of the total number of new product combinations, excluding the pre-existing and acquired (Teece, 2007). New product launches are counted, as are new product combinations (Nambisan, 2002a). The **Number New products** are a count of the specifically named as new in the annual report. The **Number Product changes** are a count of the changes in the product portfolio from the prior year (Barkema and Schijven, 2008). The variable **Product Integration** is a unification of the new and combined product count.

The product portfolio make up is collected and grouped using content analysis of press announcements at the time of acquisitions in line with prior research (Léger and Quach, 2009).

Performance

Revenues collected from customers are being used to measure performance as used by prior research (Grimaldi and Torrisi, 2001). This variable is the reported revenue value in United States Dollars and rounded to thousands.

Licence Revenue used in the Software industry is revenue acquired solely by software sales (licence sales). Total Revenue includes licence sales as well as revenues from product maintenance and professional services. Used for robustness testing, this variable is the reported licence revenue value in United States Dollars and rounded to thousands.

Independent Variables

Acquisitions

Software Compatibility is a dichotomous variable – it is where the acquisition is based on the same technology standards. Data comes from the annual report as well as news reports, obtained by content analysis. Compatibility in technology is a management consideration in market place standards setting. It is also an antecedent of contribution to performance post mergers and acquisition (Augier and Teece, 2009, Léger and Quach, 2009).

Software Complementarity is a dichotomous variable - it is where the joint use adds more value to the customer than the use of separate products. Data comes from the annual report as well as news reports, obtained by content analysis. Prior studies in mergers and acquisitions value creation emphasises the importance of knowledge complementarities between targets and acquirers, and suggests that firms in high-technology industries have a higher likelihood of achieving novel

inventions if they can identify and acquire businesses that have scientific and technological knowledge that is complementary to their own (Léger and Quach, 2009, Hitt et al., 2009).

Acquisition of Competencies is a dichotomous variable – it is the acquisition of technical know-how or specific technologies. Data comes from the annual report as well as news reports, obtained by content analysis. Acquisition of competencies is a main antecedent that influences business performance post merger in software firms (Léger and Quach, 2009).

Divestments

Divestments People: is a dichotomous variable, set when the firm has divested people as a direct result of the acquisition. Pierce and Teece (2005) assert that researchers should find it useful to explore how experience in integrating and divesting diverse (or related) assets may lead to superior performance.

Number of Products Divested: is a count of the number of named divested products reported. The divestment of dying products will enable opportunities for innovation (Augier and Teece, 2007). As used in Barkema and Schijven (2008, p.706), a count of the number of divestments will impact the portfolio other than by reconfiguring.

Appropriability Regime

The **appropriability regime** is a dichotomous variable coded as zero (weak) or one (tight). Firms can protect their technology through legal appropriability regimes, such as patent and copyright (tight appropriability regime), or through strategic appropriability regimes, such as business secrecy, lead time advantage and complexity of product designs (weak appropriability regime) (Elche-Hotelano, 2011; Teece, 2006; Winter, 2006; Xu, Huang and Gao, 2012).

Organisation Restructure

The variable **Nr organisation restructures** is a count of organisational restructuring events (Barkema and Schijven, 2008) documented in the annual reports, for example an addition to the count would be Citrix (2009, p.14) who state *"On January 28, 2009, we announced a strategic restructuring program"*.

Geographic scope

The number of different countries has been counted for the geographic range related to sales (**Nr Sales Countries**) and software development (**Nr Development Countries**). The country variables are a count based on the named countries in the annual report – if the word 'Global' is used to describe the countries then 10 is allocated, 0 is used where none are given. This tends to be where the whole of the software development is outsourced to a third party.

Nr Business Model changes

The variable **Number Business Model Changes** is a count of the number of business model changes employed compared to the prior year, namely: changes to the customer market segments, the product lines, the product features and the revenue capture methods based on the dynamic capabilities framework (Teece, 2007). The business model measures are collected individually from the annual report and include the number of sales channels (revenue capture methods), target markets and customer market segments. Each of these are measured and the differences from the prior year counted giving the number of the business model changes (Teece, 2006, p.1142).

Control Variables

Organisation Size: The organisational size might influence performance, behaviour and capabilities. In line with prior research I have used the number of employees as a proxy for firm size (Barkema and Schijven, 2008; Xu et al., 2012).

Number of products: a count of the products to address the product scope as it affects the firm performance (Barkema and Schijven, 2008; Palich et al., 2000).

Target Markets: a count of the number of markets served by the company irrespective of geography. This explains the scope of the product portfolio offering to the customer. Any changes to the business model impact the value proposition to the customer (Teece, 2011) thus the initial markets scope is controlled for.

Number of related acquisitions: To address the question of acquisition experience, the number of acquisitions is to be used (Barkema and Schijven, 2008).

Research and Development value: Teece (2007, p.1323) identifies R&D as the organisation learning capacity. As the amount allocated to R&D indicates the organisations capacity to access, and shape developments it is controlled for.

Year dummies: to control for the influence of economic trends and acquisition waves (Barkema and Schijven, 2008).

The theoretical model is shown in Figure 8 with the independent, outcome and control variables added.

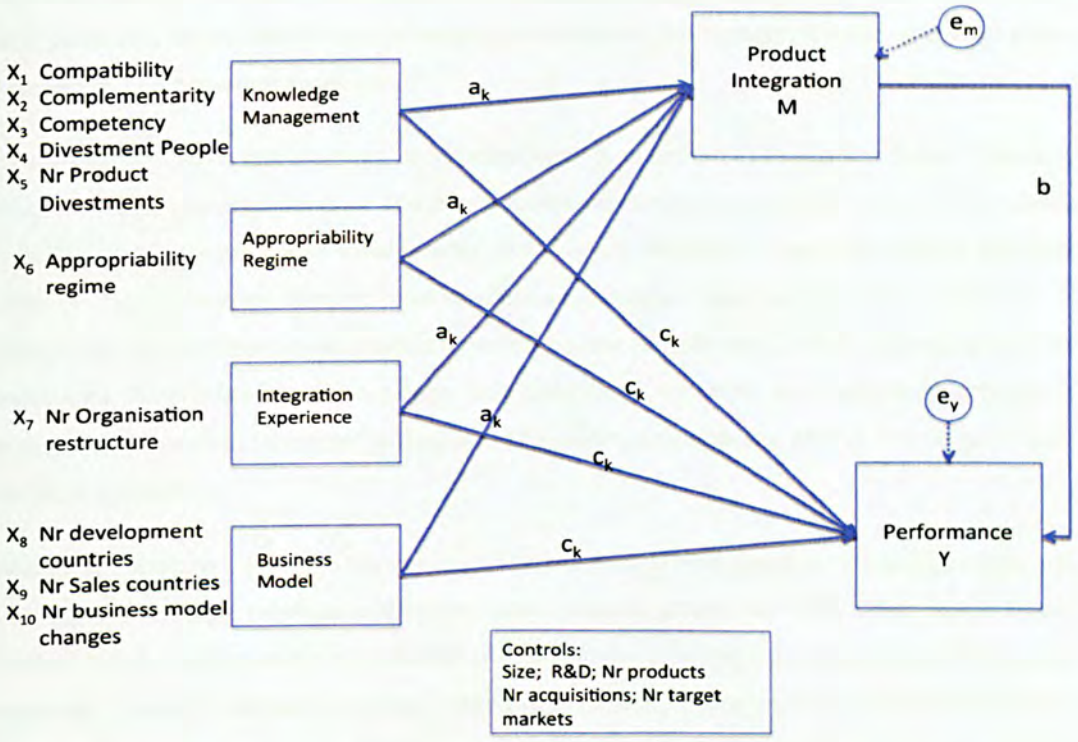


Figure 8 Theoretical Framework with Variables and controls

The represented model in Figure 8 contains two consequent variables (product integration and performance). The model has *k* X variables passing their effects directly to a single Y, and indirectly through a single M. Thus, there are *k* direct and indirect effects, one for each X. As there are two consequent variables, this means that there are two linear models (one for each consequent):

$$M = i_1 + a_kX_1 + a_kX_2 + ... + a_kX_{10} + e_M$$

$$Y = i_2 + c_kX_1 + c_kX_2 + ... + c_kX_{10} + bM + e_Y$$

Where i_1 and i_2 are the regression intercepts, and e_M and e_Y are errors in the estimation of M and Y respectively, and a, b, and c' are the regression coefficients given to the anticedants (Hayes, 2013, p.194).

Data Analysis Methods

Panel data are most useful when controlling for time constant unobserved features that may be correlated with the explanatory variables in the model (Wooldridge, 2009, p.458). This research uses time series data with a row for each company, with measures per company for each year over a ten-year period, in other words Panel data.

Garson (2013) explains that the term 'Longitudinal Data' is an umbrella term for a variety of statistical procedures that deal with any type of data measured over time. For example: Time series analysis, typically used to measure one variable with ARIMA (Auto Regressive Integrated Moving Average) when the focus is on time-to-event (time-to-adopt an innovation, time-to-death after treatment). If there is one data row per subject (company) with time as a variable, this is not considered to be time series data. Time series data has multiple rows per subject with time as a variable – each row is treated as independent. Whilst the analysis could be undertaken with, say, ANOVA the danger of type I errors is inflated.

With longitudinal data, observations may cluster by the units of time (year) in turn causing errors and violating the assumptions of general linear models (Garson, 2013). The SPSS Linear Mixed Model handles autocorrelation and the multilevel effects (within-subject and between-subject dependent residuals). Unlike the Generalised Linear models (OLS regression with time as a variable) or General Estimating Equations analysis, in LMM dependent variable need not have homogenous variances across time. LMM can also handle a non-balanced design, for example, where a subject does not have measures for all the time periods, as in my research (Garson, 2013). West 2009, cited in Garson (2013) points out five reasons why an SPSS Linear Mixed Model (LMM) is preferred:

1. LMM allows for consideration of continuous variables, which may be either time-invariant or time-varying covariates.
2. LMM does not perform list-wise dropping of subjects from the analysis simply due to the presence of even a single data point, but rather is a full information procedure.
3. LMM supports assumption of any of several alternative repeated measures and random effect covariance structures.
4. LMM allows subject level-level predictors to explain variance in longitudinal growth curve.
5. LMM does not require subjects to be analysed at the same time points, nor does it require balanced designs (equal size groups) for its estimates.

Heck, Thomas and Tabata (2014) agree, adding that IBM SPSS Multilevel modelling removes the need to choose between individual-level analysis and group level analysis.

For these and other reasons, longitudinal analysis is increasingly conducted by LMM rather than, for example ANOVA. I will be using LMM provided by IBM SPSS (SPSS) within their mixed model options. The SPSS Linear Mixed Models procedure expands the general linear model so that error terms and

random effects are permitted to exhibit correlated and non-constant variability. The linear mixed model, therefore, provides the flexibility to model not only the mean of a response variable, but its covariance structure as well (IBM, 2014). I will use the Maximum Likelihood (ML) estimation method option rather than the Restricted Maximum Likelihood estimation (REML) option since ML can be used for model comparisons and likelihood ratio tests. In addition, when fixed effects differ, as they do when different models have different predictors, ML estimation should be used (Field, 2009; Garson, 2013). Heck, Thomas and Tabata (2014) explain that in the past, multilevel models were limited by the need to have a balanced sample size. For unbalanced samples an iterative process that incorporates information about each group is needed to achieve efficient estimates - ML is used for this purpose.

Using observational data this econometric study measures effects on financial performance by organisational behaviours, mediated by software product integration.

The regression analysis discussed will be used to establish evidence of a direct relationship between the organisation behaviours to the performance and with the organisation behaviours towards product integration. Utilising regression analysis method is in line with prior research in this field (Barkema and Schijven, 2008; Léger and Quach, 2009; Makri, Hitt and Lane, 2010). I will also be lagging the independent variables. Lagging can greatly reduce the threat of spuriousness due to unobserved heterogeneity (Allison, 1990, cited in Barkema and Schijven, 2008, p.712).

The mediation tests are to establish whether product integration influences the effect of the organisation behaviours on performance. I will use the Normal Theory Approach referred to here as the Sobel Test (Hayes, 2013). Preacher, Rucker and Hayes (2007) disentangle conflicting definitions of mediation theories for the applier researcher and provide macros for SPSS as well as an online resource (Preacher and Leonardelli, 2014). The coefficients obtained by Maximum Likelihood regression routines are specifically identified as appropriate for use with the Sobel test as described by Preacher, Rucker and Hayes (2007). The test, first proposed by Sobel (1982), is often referred to as the *delta method*. In Figure 8, the diagram of the simple mediation model shows a, b, and c, which are the path coefficients, used. Values in parentheses are standard errors of those path coefficients. The Sobel test requires the standard error of a or s_a (which equals a/t_a where t_a is the t test of coefficient a) and the standard error of b or s_b. The Sobel test provides an approximate estimate of the standard error of ab which equals to the square root of $b^2s_a^2 + a^2s_b^2$. Other approximate estimates of the standard error of ab standard errors have been proposed, but the Sobel test is by far the most commonly used estimate (Kenny, 2014).

Hayes (2013) explains that Mediation analysis is a statistical method used to help answer the question as to how some causal agent X transmits its effect on Y. The simple mediation model shown below in Figure 9, contains two consequential variables (M) and (Y) and two antecedent variables (X) and (M), with X causally influencing Y and M, and M causally influencing Y. In this model there are two distinct

routes by which a specific X variable is proposed as influencing Y. These routes are found by tracing every way I can get from X to Y in a single direction. This means testing the effects of X to Y without passing through M, called the direct effect of X on Y. The second route of X to Y is the indirect effect of X on Y through M, the stages are from X to M and then from M to Y. The indirect effect represents how X influences Y through the causal sequence.

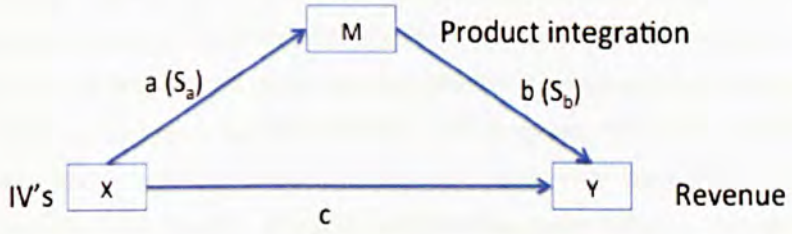


Figure 9 Simple Mediation Model

The Sobel test used is a method of testing the significance of a mediation effect. In mediation, the relationship between the independent variable and the dependent variable is hypothesised to be an indirect effect that exists due to the influence of a third variable (the mediator). The Sobel test provides a method to determine whether the reduction in the effect of the independent variable, after including the mediator in the model, is a significant reduction and therefore whether the mediation effect is statistically significant (Hayes, 2013; Preacher and Leonardelli, 2014). The simple mediation model tests each independent variable's influence on revenue through the intervention of product integration.

To test the indirect effect on revenue through product integration, I will run Sobel mediation tests. The Sobel equation used is z-value = a*b/SQRT(b2*sa2 + a2*sb2), it performs best with sample sizes over 50 and where each of the variables measured have the same sample size (Hayes, 2013; Preacher and Leonardelli, 2014).

Analyses

Direct effects are achieved by using SPSS Linear Mixed Models: Fixed Effects. The fixed effects model builds non-nested main effects, i.e. creates a main effect term for each selected variable. The estimation type used is Maximum Likelihood. The Type III sum of squares has been used; the Type III sums of squares have one major advantage in that they are invariant with respect to the cell frequencies as long as the general form of estimability remains constant. Hence, this type of sums of squares is often considered useful for an unbalanced model with no missing cells (Field, 2009). The R-squared estimates are not reported under maximum likelihood estimates (Heck, Thomas and Tabata, 2014). The SPSS output generates an intercept, which means that the coefficients are not standardised. In other words, the unstandardized coefficients are in their original metrics (Heck, Thomas and Tabata, 2014, Noymer, 2014). As advocated by Hayes (2013, p.200), by reporting the results in an unstandardised metric, the analytical results map directly onto the measurement scales used within the study and can then be directly compared across studies using the same scales.

To test whether there is an indirect effect of the independent variables on performance influenced by product integration, I will use a Sobel test on this simple mediation model (Hayes, 2013; Preacher, 2014). This model contains two consequent variables; product integration and performance (revenue), and two antecedent variables; the independent dynamic capability (behaviour) variable and the product integration count, with the independent variable causally influencing product integration and product integration influencing performance.

The models have been created to test each pathway for the independent variables to the dependent variables: performance and product integration. This is to enable a moderation test to establish whether the independent variables have an effect on performance when moderated by product integration (Field, 2013; Hayes, 2013). What I am trying to establish is whether the organisational behaviours have a direct effect on performance, or whether they indirectly affect performance through product integration. This indirect effect represents how performance is influenced by the organisational behaviours through a causal sequence in which the organisation behaviours influence product integration, which in turn influences performance (Hayes, 2013).

In the tables shown below, the intercept is interpreted as the mean of the outcome (example: Revenue) when all the predictors have a value of zero. The predictor estimates (coefficients or slopes) are interpreted the same way as the coefficients from a traditional regression (Field, 2009b).

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Results

In this section I will lay out the findings from the analysis. First I will show the high level results followed by the detailed analysis and steps taken.

Descriptives and Correlations

Variable	Mean	Std. Deviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Nr Products integrated	2.78	2.538																		
2 Revenue	2562810.83	8618856.385	.093*																	
3 Nr new Products	1.7	1.566	.690**	.195**																
4 Revenue from licence	1385554.22	4759042.361	-.111*	0.054	-0.077															
5 Appropriability Regime	0.88	0.324	-0.041	0.073	0.04	0.088														
6 Nr business model changes	1.46	1.178	.449**	-0.011	.189**	-0.044	-0.063													
7 Nr Org restructure	0.37	0.497	-0.012	-0.008	-0.04	.094*	.145**	-0.071												
8 Competency acq	0.69	0.465	.117*	.149**	0.062	-0.027	0.071	.126**	0.056											
9 Complementarity acq	0.59	0.491	.153**	.196**	0.066	-0.036	.103*	.138**	.090*	.810**										
10 Compatability acq	0.6	0.49	.096*	.123**	0.008	0.012	0.082	.105*	0.081	.821**	.745**									
11 Nr related divest product	0.37	0.767	0.02	.410**	0.035	.103*	0.062	0.001	0.027	.272**	.188**	.204**								
12 Nr country sales	8.52	3.354	.207**	.101*	.185**	.116*	.270**	.094*	.194**	0.086	.186**	.145**	0.034							
13 Nr target markets	3.7	2.98	.100*	.163**	.112*	.121**	0.08	.155**	.098*	-0.013	-0.011	-0.018	0.089	.241**						
14 Nr country devel	5.31	4.499	0.056	.176**	0.043	-.144**	.278**	0.016	.288**	.107*	.180**	0.082	.103*	.414**	.230**					
15 Nr related acq	1.97	2.65	.136**	.556**	.126**	0.055	0.081	0.081	0.048	.461**	.449**	.367**	.590**	.142**	.174**	.170**				
16 Nr products	18.69	16.596	.299**	.424**	.325**	-.122**	.165**	0.056	0.065	.195**	.233**	.178**	.208**	.215**	.124**	.208**	.359**			
17 Nr employees	6078.56	15824.871	.108*	.884**	.177**	0.002	0.062	-0.015	0.056	.164**	.210**	.150**	.387**	.123**	.283**	.233**	.599**	.474**		
18 R&D Value	295297.67	1119051.523	.130**	.893**	.250**	-0.031	0.049	-0.024	-0.047	.120**	.159**	0.079	.334**	0.071	0.027	.156**	.450**	.390**	.696**	
19 Related divest people	0.06	0.234	-0.007	-0.041	-0.06	-0.046	.091*	-0.007	.136**	0.073	.097*	0.076	.122**	0.083	0.022	.105*	0.026	0.075	-0.02	-0.034

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 10 Descriptive Statistics and Correlations

Figure 10 illustrates the descriptive statistics and correlations results for the 481 rows of data. There is little correlation between the main independent variables with the expected exception of the number of new products and the product integration variable, which itself is composed of new and changed products. As noted by Field (2009), correlations above .80 or .90 as being very high. The variables, Nr employees and R&D value, have a very high correlation to revenue; however, they are used as control variables only. R&D also tends to be high in prior research on technology integration post mergers and acquisition (Ahuja and Katila, 2001; Cloodt, Hagedoorn and Van Kranenburg, 2006).

There is also a high correlation of competency to complementary and compatibility. These variables are indicator (dummy) variables that I would expect to have a highly correlated interrelationship; the acquisition of technology competencies will most likely be either for a technologically complementary or compatible product acquisition. Because I want to include these variables due to their importance in prior models and because I need to control for unobserved heterogeneity, I will keep the variables in my model. In addition, with nested data structures, the multilevel approach immediately provides a set of critical advantages over conventional, flat modeling where these structures emerge as unaccounted-for heterogeneity and correlation (Scott, Simonoff and Marx, 2013). I am using SPSS multilevel modeling using a time constant variable and fixed effects, this is a method for obtaining valid statistical inferences in the presence of unobserved heterogeneity (Wooldridge, 2009; M. Arellano, 2003).

Overall, the magnitudes of the correlations suggest that multicollinearity is not a problem in the models. The standard linear regressions (Figure 30) have a VIF of less than 10 confirming a low level of concern (Field, 2009). However, I will measure the colinearity diagnostics in the regression models.

In Figure 11 I present the results of the Maximum Likelihood Fixed Effect regression model explaining the variance to the performance of the firm. The model is also estimated with one-year time-lagged independent variables (dependent variables are T+1). There is significance ($p<.1$) to three of the independent variables namely related product divestments, the number of countries used for development and the appropriability regime. T+1 adds business model changes.

In Figure 12 I present the results of the Maximum Likelihood Fixed Effect regression model explaining the variance to the achievement of product integration. The model is also estimated with one-year time-lagged independent variables (dependent variables are T+1). There is significance ($p<.1$) to three of the independent variables namely, the number of countries used for sales, the number of business model changes and the appropriability regime. T+1 adds competency and the divestment of people due to the acquisition.

As this is an explanatory approach based study, the specification of the theoretical model is based on theory and the removal of variables is not appropriate. Should the research be predictive in its approach, the variables that are not statistically significant might be removed (Heck, Thomas and Tabata, 2014). In addition, Heck, Thomas and Tabata (2014) explains that as these results are from multilevel analyses, the standard errors generated are more conservative, adjusting for clustering which generally results in a lowering of significance but also a reduction on Type I errors

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Direct effect model: Revenue

Dependent Variable: Revenue	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7	MODEL 8	MODEL 9	MODEL 10	MODEL 11	MODEL 12 (T+1)
Variable	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	83,173.746	118,998.596	122,492.267	93,640.252	183,897.893	167,904.177	310,576.681	-56,430.607	-185,493.650	-503,951.690	-538,329.374	-832,193.001
Nr_target_markets	15,888.399	17,187.293	17,931.070	18,394.977	18,359.059	20,819.191	35,839.954	26,845.041	20,740.215	19,465.963	20,092.991	10,302.839
Nr_related_acquisitions	53,138.349	-27,108.702	-30,950.226	-35,808.816	-25,818.406	-26,098.791	-29,797.859	-34,813.971	-37,919.906	-38,362.218	-43,547.045	-114.818
Nr_products	-20,821.295**	-20,108.578**	-20,255.526**	-20,390.029**	-20,398.979**	-20,078.143**	-18,727.637**	-19,994.624**	-20,244.710**	-21,837.797**	-21,188.253**	-23,279.559**
Nr_employees	277.930***	277.810***	277.880***	278.040***	276.711***	277.330***	278.333***	279.787***	280.682***	282.038***	281.435***	314.327***
R&D_Value	4.194***	4.169***	4.166***	4.164***	4.166***	4.152***	4.167***	4.162***	4.161***	4.159***	4.154***	4.296***
Nr_related_divest		499,214.160**	499,536.413**	505,889.176**	522,226.835**	525,338.202**	531,825.211**	541,133.441**	545,939.905**	536,181.865**	567,723.390**	870,863.094***
Compatability_acq			49,772.007	-16,767.810	189,234.546	201,778.133	150,457.031	88,491.614	81,967.331	70,368.420	72,250.844	870,863.094
Complementarity_acq				100,248.635	283,251.453	309,841.082	428,319.878	372,907.749	366,687.857	355,126.798	383,889.670	577,829.415
Competency_acq					-465,767.528	-486,341.296	-508,835.879	-415,684.400	-425,601.481	-416,442.518	-426,108.565	-715,367.134
Nr_Org_restructure						-214,426.063	-83,904.372	-105,094.267	-88,089.365	-108,808.011	-83,741.592	-160,442.433
Nr_country_devel							-56,009.351*	-67,185.613*	-66,452.691**	-75,367.955**	-74,005.193**	-86,701.444**
Nr_country_sales								45,424.614	43,432.447	31,678.773	32,419.872	39,436.538
Nr_business_model_changes									86,587.099	106,792.352	103,874.802	201,845.355*
Appropriability_Regime										704,606.158*	719,402.658*	903,228.127*
Related divest people											-532,957.809	-767,524.989
x2 change		8.95	0.05	0.09	1.00	1.05	5.07	1.70	0.78	4.49	-93.07	2.47
2LL	15432.55	15423.60	15423.55	15423.46	15422.46	15421.42	15416.35	15414.65	15413.87	15409.38	15502.44	15499.98
WALD Z	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51
MODEL F (INTERCEPT)	0.00	0.01	0.01	0.01	0.02	0.02	0.06	0.00	0.02	0.14	0.29	0.32

Year dummies are reported in the Appendix. Model 12 shows the dependent variable one year ahead, independent variables are time lagged.
N=481
• p < .10
* p < .05
** p < .01
*** p < .001

Figure 11 Results of Fixed Effect Regression model for dependent variable: Revenue

Direct effect model: Product integration

Dependent Variable:Product Integration	MODEL 21	MODEL 22	MODEL 23	MODEL 24	MODEL 25	MODEL 26	MODEL 27	MODEL 28	MODEL 29	MODEL 30	MODEL 32	MODEL 33 (T+1)
Variable	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	5.79***	5.78***	5.79***	5.67***	5.67***	5.66***	5.68***	4.74**	3.31**	3.60**	3.58**	0.92
Nr_target_markets	0.09*	0.09*	0.09*	0.09*	0.09*	0.09*	0.10*	0.07+	0.006	0.01	0.01	0.04
Nr_related_acquisitions	0.07	0.11+	0.083	0.06	0.06	0.06	0.06	0.05	0.014	0.01	0.01	-0.01
Nr_products	0.05***	0.05***	0.05***	0.04***	0.04***	0.05***	0.05***	0.04***	0.04***	0.04***	0.04***	0.04***
Nr_employees	0.00*	0.00**	0.00*	0.00*	0.00*	0.00*	0.00*	0.00+	0.000	0.00	0.00	0.00
R&D_Value	0.00	0.00+	0.00+	0.00+	0.00+	0.00+	0.00+	0.00	0.00+	0.00+	2.12+	0.00
Nr_related_divest		-0.23	-0.228	-0.20	-0.20	-0.20	-0.20	-0.18	-0.123	-0.11	-0.10	-0.10
Compatability_acq			0.340	0.06	0.04	0.05	0.04	-0.12	-0.189	-0.18	-0.18	-0.17
Complementarity_acq				0.42	0.40	0.41	0.44	0.29	0.226	0.24	0.25	0.07
Competency_acq					0.05	0.03	0.03	0.27	0.159	0.15	0.15	0.82+
Nr_Org_restructure						-0.14	-0.11	-0.17	0.022	0.04	0.05	-0.10
Nr_country_devel							-0.01	-0.04	-0.031	-0.02	-0.02	-0.01
Nr_country_sales								0.12**	0.09**	0.10**	0.11**	0.16***
Nr_business_model_changes									0.96***	0.94***	0.94***	0.20+
Appropriability_Regime										-0.62**	-0.62+	-1.23**
Related divest people											-0.30	-1.31**
x2 change		0.74	3.00	1.43	0.01	0.38	0.16	10.14	96.15	3.93	-118.61	
2LL	2181.922	2181.185	2178.182	2176.752	2176.743	2176.362	2176.206	2166.062	2069.917	2065.987	2184.595	
WALD Z	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	15.51	
MODEL F (INTERCEPT)	18.07	18.03	18.26	17.46	17.32	17.27	17.40	11.82	6.97	8.17	0.49	0.42

Year dummies are reported in the Appendix. . Model 33 shows the dependent variable one year ahead, independent variables are time lagged
N=481
+ p < .10
* p < .05
** p < .01
*** p < .001

Figure 12 Results of Fixed Effect Regression for dependent variable: Product integration

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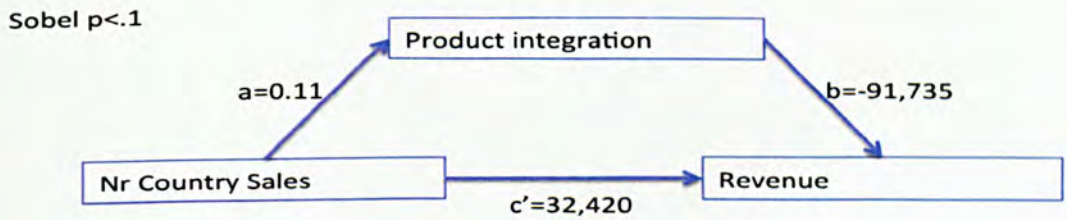
Indirect effect model: Independent Variables to Revenue via Product integration

		(Y) Revenue			M (Product Integration)			Sobel Test
Antecedant		Estimate	SE	Sig.	Estimate	SE	Sig.	Sig.
M	Product integration	-91735	43,544	0.04	-	-	-	-
X1	Compatability_acq	72,251	377,108	0.85	-0.18	0.36	0.62	0.62
x2	Complementarity_acq	383,890	381,336	0.31	0.25	0.36	0.49	0.51
x3	Competency_acq	-426,109	465,135	0.36	0.15	0.44	0.74	0.70
x4	Related divest people	-532,958	443,676	0.23	-0.30	0.42	0.47	0.63
x5	Nr_related_divest	567,723	167,894	0.00	-0.10	0.16	0.54	0.58
x6	Appropriability_Regime	719,403	331,431	0.03	-0.62	0.31	0.05	0.15
x7	Nr_Org_restructure	-83,742	216,958	0.70	0.05	0.21	0.79	0.88
x8	Nr_country_devel	-74,005	26,400	0.01	-0.02	0.03	0.38	0.41
x9	Nr_country_sales	32,420	35,040	0.36	0.11	0.03	0.00	0.08
x10	Nr_business_model_changes	103,875	97,984	0.29	0.94	0.09	0.00	0.04

N=481

Figure 13 Model estimates for the product integration mediation analysis.



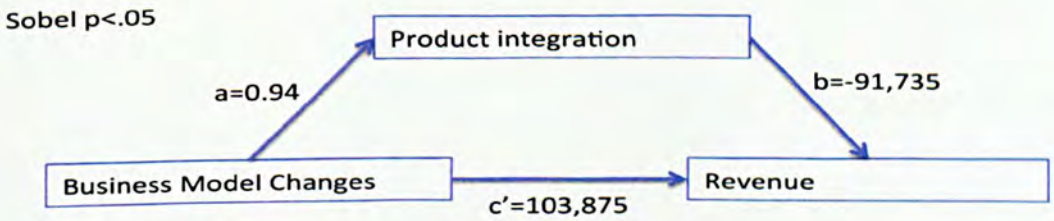


Figure 14 Model results: Indirect effects on revenue from product integration

As described in the theoretical framework in Figure 8, the four stages to the analysis are presented in Figure 11 through to Figure 14, detailing:

- Figure 11 - the direct results of the dynamic capabilities behaviours to performance
- Figure 12 - the direct results of the dynamic capabilities behaviours to product integration
- Figure 13 - a table of the direct and indirect results of product integration to performance together with the direct effects.
- Figure 14 - a diagram of the significant indirect results of product integration to performance.

Product integration

The results in Figure 13 show good and bad news in that product integration does affect revenue, but negatively. The increase in product integration success gives a reduction in revenue of $-91,735 ($F(1,481)=4.43$, $p<0.05$). These results are broadly in line with Barkema and Schijven (2008) who found that the impact on performance in highly acquisitive firms is negative; even though they looked at accounting measures and posited that this was feasibly due to the costs of creating the product integration changes.

Knowledge management

Regarding the tests of the set of hypotheses 1 depicted in Figure 13, I have found that Revenue increases by $567,723 when products are divested ($F(1,481)=11.434$, $p<.05$). However, when controlling for size of firm and R&D spend, there is no evidence that the acquisition of competencies, complementary technology or compatible software have any direct effect on product integration, revenue or indirectly on revenue through product integration. Léger and Quach (2009) also found that there was no impact on performance from complementarity or competency acquisition in software. However, they did see that compatibility had an impact. Their study measured the price/book ratios and was therefore heavily influenced by the firm's debts. This finding goes towards explaining the Orr (2006) study conclusion that divestments are attractive to management.

Hypothesis 1 results

- H1a. The **acquisition of compatible technologies** through mergers and acquisitions has an indirect effect on the acquirer's performance through product integration - **Not supported**
    - The acquisition of compatible technologies through mergers and acquisitions has a direct effect on the acquirer's product integration - **Not supported**. Robustness tests found support for new product development
    - The acquisition of compatible technologies through mergers and acquisitions has a direct effect on the acquirer's performance - **Not supported**.
- H1b. The **acquisition of complementary technologies** through mergers and acquisitions has an indirect effect on the acquirer's performance through product integration - **Not supported.**
    - The acquisition of complementary technologies through mergers and acquisitions has a direct effect on the acquirer's product integration - **Not supported**.
    - The acquisition of complementary technologies through mergers and acquisitions has a direct effect on the acquirer's performance - **Not supported**. Robustness tests found support for Licence revenue.
- H1c. **The acquisition of competencies** through mergers and acquisitions has an indirect effect on the acquirer's performance through product integration - **Not supported**.

- The acquisition of competencies through mergers and acquisitions has a direct effect on the acquirer's product integration **Supported**. Support also found for new product development.
- The acquisition of competencies through mergers and acquisitions has a direct effect on the acquirer's performance - **Not supported**.

- H1d. The **divestment of products** post mergers and acquisition has an indirect effect on the acquirer's performance through product integration - **Not supported**.
  - The divestment of products post mergers and acquisition has a direct effect on the acquirer's product integration - **Not supported.**
  - The divestment of products post mergers and acquisition has a direct effect on the acquirer's performance - **Supported**.
- H1e. The **divestment of people** post mergers and acquisition has an indirect effect on the acquirer's performance through product integration - **Supported**.
  - The divestment of people post mergers and acquisition has a direct effect on the acquirer's product integration – **Supported**. Support also found for new product development.
  - The divestment of people post mergers and acquisition has a direct effect on the acquirer's performance – **Not supported**.

Appropriability regime

Regarding the tests of hypothesis 2 in Figure 13, I have found that revenue increases when the firm has a tight legal appropriability regime ($c'=719{,}403$, $p<.05$, $F(1,481)=4.71$). This finding supports the Teece (2007) position that a tight regime is an indicator to competitive advantage. Perhaps due to the nature of a tight appropriability regime in a software house, the development of increased product integration is also significantly effected albeit negatively ($a=-.62$, $p<.1$, $F(1,481)=3.84$); this finding supports Grimaldi and Torrisi (2001) who found that within software houses, the implementation of a tight appropriability regime can hamper innovation. There is no indirect effect from the appropriability regime on performance.

Hypothesis 2 results.

- H2. The **appropriability regime** post mergers and acquisitions has an indirect effect on the acquirer's performance through product integration - **Supported**.
  - The appropriability regime post mergers and acquisitions has a direct effect on the acquirer's product integration - **Supported**. Robustness tests also found support for Changed product.
  - The appropriability regime post mergers and acquisitions has a direct effect on the acquirer's performance - **Supported**.

Integration experience

Regarding the tests of hypothesis 3, in line with (Barkema and Schijven, 2008), when controlling for the number of acquisitions, there is a disruptive effect on the business, albeit not significantly. Figure 13 and Figure 14 show that I have found no evidence to support that an organisation's restructure will have a significant effect on product integration, revenue or indirect effect on revenue through product integration.

Hypothesis 3 results

- H3. Organisation restructuring has an indirect effect on performance through product integration – **Not supported**.
    - Organisation restructuring has a direct effect on the acquirer's product integration – **Not supported**. Robustness tests found support for New product development.
    - Organisation restructuring has a direct effect on the acquirer's performance - **Not supported**. Robustness tests found support for Licence revenue.

Business model

Regarding the tests of the set of hypotheses 4, my findings broadly support Pierce and Teece (2005) who explain that the business model is key to extract value from business changes, which would be acquisitions as well as product changes. The business model construct indirectly influences revenue through its effect on product integration. As can be seen from Figure 13 and Figure 14 above, changes to the business model have an effect of $103,875 on revenue although this is not significant statistically ($p>.1$, $F(1,481)=1.12$). However, business model changes do have a significant effect on product integration ($a=.94$, $F(1,481)=102.05$, $p<.05$) and indirectly on revenue through product integration ($p<.05$).

Increasing the number of countries used for sales has a very similar effect to the number of changes in the business model, in that it has a direct effect on product integration ($a=.11$, $p<.05$, $F(1,481)=3.17$) and an indirect effect on revenue through product integration ($p<.1$).

Increasing the number of countries used for software development has a significant direct effect on revenue ($p<.05$, $F(1,481)=7.89$), however this is a negative effect ($c'=\$-74,005$).

Hypothesis 4 Results

- H4a. The number of **countries used for software development** has an indirect effect on performance through product integration - **Not supported**.
    - The number of countries used for software development has a direct effect on the acquirer's product integration - **Not supported**.

- The number of countries used for software development has a direct effect on the acquirer's performance - **Supported.**

- H4b. The number of **countries used for sales** has an indirect effect on performance through product integration - **Supported.**
  - The number of countries used for sales has a direct effect on the acquirer's product integration - **Supported.**
  - The number of countries used for sales has a direct effect on the acquirer's performance - **Not supported.** Robustness tests found support for Licence revenue.
- H4c. The number of **changes to the business model** has an indirect effect on performance through product integration - **Supported.**
  - The number of changes to the business model has a direct effect on the acquirer's product integration - **Supported.**
  - The number of changes to the business model has a direct effect on the acquirer's performance - **Supported.**

Indirect effect model: Independent Variables to Revenue T+1 via Product integration T+1

		(Y) Revenue T+1			M (Product Integration T+1)			Sobel Test
Antecedant		Estimate	SE	Sig.	Estimate	SE	Sig.	Sig.
M	Product integration	-76,525	48,800	0.12	-	-	-	-
M	Product integration T+1	-84,530	46,595	0.07	-	-	-	
X1	Compatability_acq	870,863	414,973	0.92	-0.17	0.40	0.67	0.67
x2	Complementarity_acq	577,829	419,625	0.17	0.07	0.41	0.87	0.85
x3	Competency_acq	-715,367	511,838	0.16	0.82	0.49	0.10	0.22
x4	Related divest people	-767,525	488,225	0.12	-1.31	0.47	0.01	0.12
x5	Nr_related_divest	870,863	184,752	0.00	-0.10	0.18	0.60	0.62
x6	Appropriability_Regime	903,228	364,708	0.01	-1.23	0.35	0.00	0.10
x7	Nr_Org_restructure	-160,442	238,743	0.50	-0.10	0.23	0.65	0.80
x8	Nr_country_devel	-86,701	29,051	0.00	-0.01	0.03	0.72	0.73
x9	Nr_country_sales	39,437	38,558	0.31	0.16	0.04	0.00	0.09
x10	Nr_business_model_changes	201,845	107,822	0.06	0.20	0.10	0.05	0.18

N=481

Figure 15 Model estimates for the product integration T+1 mediation analysis

As shown in Figure 15 and Figure 16, I found that the antecedents are slightly different when time lagged (Revenue and product integration are T+1). The acquisition of competencies has an effect (p=.1, F(1,481)=2.78) on product integration, increasing the number of successes by an estimate of .82. Divesting people has a significant negative effect on product integration (a=-1.31, p<.05, F(1,481)=-2.766). Divesting product remains significant, as does the appropriability regime, although the appropriability regime now indirectly affects revenue. The number of countries used for sales continues to positively effect product integration and indirectly affect performance. Lastly, business model changes continue to effect product integration, but now have a direct effect on revenue ($201,845, p<.1, F(1,481)=3.5) although no longer an indirect effect.

Consequently, good news and bad. These results imply that business model changes increase revenues when product integration is employed, albeit reduced by the act of product integration. A tight appropriability regime will reduce product integration efforts but will enhance revenues. Adding country locations for sales capabilities is beneficial..

Antecedant		(Y) Revenue	M (Prod Int)	Sobel Test
		Estimate	Estimate	Sig.
M	Product integration	-91735*	-	-
x5	Nr_related_divest	567723***	-0.10	0.578
x6	Appropriability_Regime	719402*	-0.61+	0.150
x8	Nr_country_devel	-74005.**	-0.02	0.406
x9	Nr_country_sales	32419.87177	0.11**	0.078
x10	Nr_business_model_changes	103874.8021	0.94***	0.039

Antecedant		(Y) Revenue T+1	M (Prod Int T+1)	Sobel Test
		Estimate	Estimate	Sig.
M	Product integration T+1	-84530+	-	-
x3	Competency_acq	-426108	0.82	0.224
x4	Related divest people	-532957	-1.30*	0.122
x5	Nr_related_divest	567723**	-0.10	0.615
x6	Appropriability_Regime	719402*	-1.23**	0.100
x8	Nr_country_devel	-74005**	-0.01	0.734
x9	Nr_country_sales	32419	0.16***	0.091
x10	Nr_business_model_changes	103874	0.20*	0.181

N=481†
p < .10
* p < .05
** p < .01
*** p < .001

Figure 16 Model estimates - Results Summary

Utilising the dynamic capabilities framework (Augier and Teece, 2007; Teece, 1988, 2010) I have found that performance is directly and indirectly effected by some of the behaviours identified. These impacts have been both positive and negative. In business practice this has resonance for the manager. The volume of activity in this sector suggests the view of acquisitions as a mechanism for accessing technology whilst the building and maintaining of expertise in multiple technologies is difficult for even the largest corporations (Ahuja and Katila, 2001). This model adds to the explanation of the complexity in decision making towards product integration post mergers and acquisitions.

Results: Robustness tests

Antecedant		(Y) Revenue			(Y) Revenue T+1			(Y) Licence Revenue			(Y) Licence Revenue T+1		
		Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.
M	Product integration	-91,735	43,544	0.04	-76,525	48,800	0.12	-174,635	90,062	0.05	-191,008	97,813	0.05
M	Product integration T+1	-63,466	41,704	0.13	-84,530	46,595	0.07	-220,140	85,817	0.01	-220,436	93,304	0.02
M	Product integration T+2	-66229	42017	0.12	-58424	47039	0.22	-250380	86316	0.00	-260590	93817	0.01
M	Nr New Products	-118,705	71,352	0.10	-78,984	79,950	0.32	-119,639	147,798	0.42	-125,290	160,535	0.44
M	Nr New Products T+1	-40,929	70,428	0.56	-66,041	78,738	0.40	-216,509	145,280	0.14	-174,018	157,957	0.27
M	Nr Changed products	-84,283	58,220	0.15	-83,632	65,145	0.20	-231,148	120,133	0.06	-256,520	130,458	0.05
M	Nr Changed products T+1	-84,283	58,220	0.15	-83,632	65,145	0.20	-231,148	120,133	0.06	-256,520	130,458	0.05
X1	Compatability_acq	72,251	377,108	0.85	870,863	414,973	0.92	680,712	751,362	0.37	720,092	817,037	0.88
x2	Complementarity_acq	383,890	381,336	0.31	577,829	419,625	0.17	-379,096	759,785	0.62	51,784	826,197	0.06
x3	Competency_acq	-426,109	465,135	0.36	-715,367	511,838	0.16	-792,466	926,750	0.39	-1,027,010	1,007,756	-1.02
x4	Related divest people	-532,958	443,676	0.23	-767,525	488,225	0.12	-1,260,835	883,994	0.15	-1,293,556	961,263	-1.35
x5	Nr_related_divest	567,723	167,894	0.00	870,863	184,752	0.00	776,026	334,518	0.02	709,733	363,758	1.95
x6	Appropriability_Regime	719,403	331,431	0.03	903,228	364,708	0.01	1,592,377	660,352	0.02	1,795,225	718,073	2.50
x7	Nr_Org_restructure	-83,742	216,958	0.70	-160,442	238,743	0.50	1,223,962	432,275	0.01	1,008,793	470,059	2.15
x8	Nr_country_devel	-74,005	26,400	0.01	-86,701	29,051	0.00	-315,001	52,600	0.00	-352,407	57,197	-6.16
x9	Nr_country_sales	32,420	35,040	0.36	39,437	38,558	0.31	277,139	69,814	0.00	308,282	75,917	4.06
x10	Nr_business_model_changes	103,875	97,984	0.29	201,845	107,822	0.06	-312,002	195,226	0.11	-418,977	212,290	-1.97

N=481

Figure 17 Results of Fixed Effect Regression Model for Revenues

Antecedant		M (Product Integration)			M (Product Integration T+1)			M (New Product)			M (New Product T+1)			M (Changed Product)			M (Changed Product T+1)		
		Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.
X1	Compatability_acq	-0.18	0.36	0.62	-0.17	0.40	0.67	-0.50	0.24	0.04	-0.14	0.24	0.57	0.32	0.27	0.24	0.32	0.27	0.24
x2	Complementarity_acq	0.25	0.36	0.49	0.07	0.41	0.87	-0.07	0.24	0.77	0.03	0.25	0.92	0.32	0.27	0.24	0.32	0.27	0.24
x3	Competency_acq	0.15	0.44	0.74	0.82	0.49	0.10	0.55	0.29	0.06	0.33	0.30	0.27	-0.40	0.33	0.22	-0.40	0.33	0.22
x4	Related divest people	-0.30	0.42	0.47	-1.31	0.47	0.01	-0.48	0.28	0.09	-0.62	0.29	0.03	0.17	0.32	0.58	0.17	0.32	0.58
x5	Nr_related_divest	-0.10	0.16	0.54	-0.10	0.18	0.60	-0.08	0.11	0.45	0.03	0.11	0.77	-0.02	0.12	0.89	-0.02	0.12	0.89
x6	Appropriability_Regime	-0.62	0.31	0.05	-1.23	0.35	0.00	-0.01	0.21	0.96	-0.16	0.21	0.45	-0.60	0.24	0.01	-0.60	0.24	0.01
x7	Nr_Org_restructure	0.05	0.21	0.79	-0.10	0.23	0.65	-0.10	0.14	0.46	-0.27	0.14	0.05	0.16	0.15	0.31	0.16	0.15	0.31
x8	Nr_country_devel	-0.02	0.03	0.38	-0.01	0.03	0.72	-0.03	0.02	0.12	-0.02	0.02	0.26	0.00	0.02	0.83	0.00	0.02	0.83
x9	Nr_country_sales	0.11	0.03	0.00	0.16	0.04	0.00	0.07	0.02	0.00	0.08	0.02	0.00	0.03	0.02	0.16	0.03	0.02	0.16
x10	Nr_business_model_changes	0.94	0.09	0.00	0.20	0.10	0.05	0.23	0.06	0.00	-0.02	0.06	0.70	0.71	0.07	0.00	0.71	0.07	0.00

N=481

Figure 18 Results of Fixed Effect regression model for product integrations

	Mediation Tests	Product Integration			Product Integration T+1			New Prd T+1	Changed Prod		Changed Prod T+1	
		Revenue	Licence Sales	Licence Sales+1	Revenu	Licence sales	Licence Sales+1	Licence sales	Licence Sa	Licence Sales+1	Licence sales	Licence Sales+1
X1	Compatability_acq	0.62	0.62	0.62	0.67	0.67	0.67	0.59	0.31	0.31	0.31	0.31
x2	Complementarity_acq	0.51	0.51	0.51	0.85	0.85	0.85	0.92	0.31	0.31	0.31	0.31
x3	Competency_acq	0.70	0.70	0.70	0.22	0.17	0.18	0.35	0.30	0.30	0.30	0.30
x4	Related divest people	0.63	0.63	0.63	0.12	0.05	0.06	0.17	0.59	0.59	0.59	0.59
x5	Nr_related_divest	0.58	0.58	0.58	0.62	0.61	0.61	0.77	0.89	0.89	0.89	0.89
x6	Appropriability_Regime	0.15	0.17	0.17	0.10	0.04	0.05	0.49	0.12	0.12	0.12	0.12
x7	Nr_Org_restructure	0.88	0.88	0.88	0.80	0.80	0.80	0.19	0.37	0.37	0.37	0.37
x8	Nr_country_devel	0.41	0.41	0.41	0.73	0.73	0.73	0.34	0.83	0.83	0.83	0.83
x9	Nr_country_sales	0.08	0.10	0.10	0.09	0.03	0.04	0.10	0.26	0.25	0.26	0.25
x10	Nr_business_model_changes	0.04	0.06	0.06	0.18	0.12	0.13	0.71	0.06	0.05	0.06	0.05

N=481

Figure 19 Results of mediation tests.

I extended the model analysis to time lag the independent variables. I also included analysis for revenue obtained directly from software licence, i.e. excluding any revenues from software maintenance and professional services (training, consultancy etc.).

Product integration did not significantly effect revenue ($p>0.1$) in the following year, although it did significantly effect ($p<.1$) the licence revenue in both the current and following year with the negative effect on revenue increasing. It would also appear that continued product integration significantly and negatively effects licence revenues, the estimate is $-220,140, $p<0.05$ in year one with an estimate of $-220,436, $p<0.05$ in the following year. The mediation (Sobel) tests showed that licence revenues and T+1 licence revenues were indirectly effected ($p<.1$) by the number of countries used for sales and the number of business model changes in the same way as revenue.

Product integration T+1 showed a significant indirect effect on licence revenue ($p<0.05$) with the number of countries used for sales, the appropriability regime in place and the divestment of people. The results are similar for licence revenue T+1.

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I dissected the moderator variable, product integration into the new product development and the changed product development and tested them separately. The moderation results were very similar to product integration.

Extending the number of countries used for sales is indirectly significant for the majority of mediator variables with alternative combinations of outcome variables.

All of the independent variables are significant either directly or indirectly, however the representation is complex; appropriately reflecting business practice. Post acquisition the firm wants to create new products for customers. However, the problems and costs are high (Nambisan, 2002a) and revenue is negatively affected. This study does not measure the impact on the customer or the perception of the market, however it does show that the acquisition of competencies and the reshaping of the workforce, with divestments of people, does have an effect.

Causality

Do acquisitions and product integration affect performance, as hypothesised, or does performance drive acquisition and product integration?

In 1979, Cook & Campbell (cited in Barkema and Schijven, 2008) explained that non-experimental research, causal inference requires:

- Correlation between cause and effect
- Temporal precedence of the cause
- Exclusion of alternative explanations

Although I took the established steps to determine causality (i.e., fixed effects and lagged independent variables), I sought to pursue the causality further through lagged dependent variable (LDV) models. In econometric terms, this was a test for Granger causality (Greene, 2003, cited in Barkema and Schijven, 2008). Using a lagged dependent variable implies conditioning on the history of all the independent variables, allowing past realisations of the dependent variable to affect its current level (Greene, 2003, cited in Barkema and Schijven, 2008). Apart from explicitly modeling autocorrelation, dependent variable lagging can greatly reduce the threat of spuriousness due to unobserved heterogeneity (Allison, 1990), to alleviate concerns about reverse causality.

Analysis Stages

As identified in Theoretical Framework, the steps taken to achieve the results above are outlined in the stages of analysis below.

Direct effects models

The models for testing the direct effect of organisation behaviours have been built one variable at a time, starting with the control variables. To compare the fit of the successive models, I have observed the -2 times the log of the likelihood (-2LL) function (Field, 2009). Comparing models using this test is most appropriate with maximum likelihood estimation. The other models provided by SPSS, such as Schwarz's Bayesian criterion (BIC) or Akaike's information criterion (AIC), are generally used for non nested models (Heck, R; Thomas, S; Tabata, 2014). I have used the -2LL number to generate the chi-square change value: χ^2Change=model1(-2LL value) -model2(-2LL value). The change to each model is 1 degree of freedom which means that the significant chi-square statistic values are 3.84 ($p<.05$) and 6.63 ($p<.01$) (Field, 2009b). The resultant chi-square values for each model reflect the significance (or lack of it) in the predicted variable effect. The chi-square likelihood ratios in these maximum-likelihood estimation nested models infer a good fit.

Step 1: Direct effects on Performance

Whilst not all the predictor variables are significant I do not want to remove them at this stage as they are also to be tested for their effect on product integration and for the effect on performance mediated by product integration. And as discussed earlier, I want to control for unobserved heterogeneity.

Of the 10 predictor variables, Figure 20 shows that only four have a significantly ($p<.1$) direct effect on performance, namely: the number of product divestments, the number of countries used for product development and the appropriability regime. I lagged the independent variables by one year and found that the data explained an additional significant value, related to business model changes.

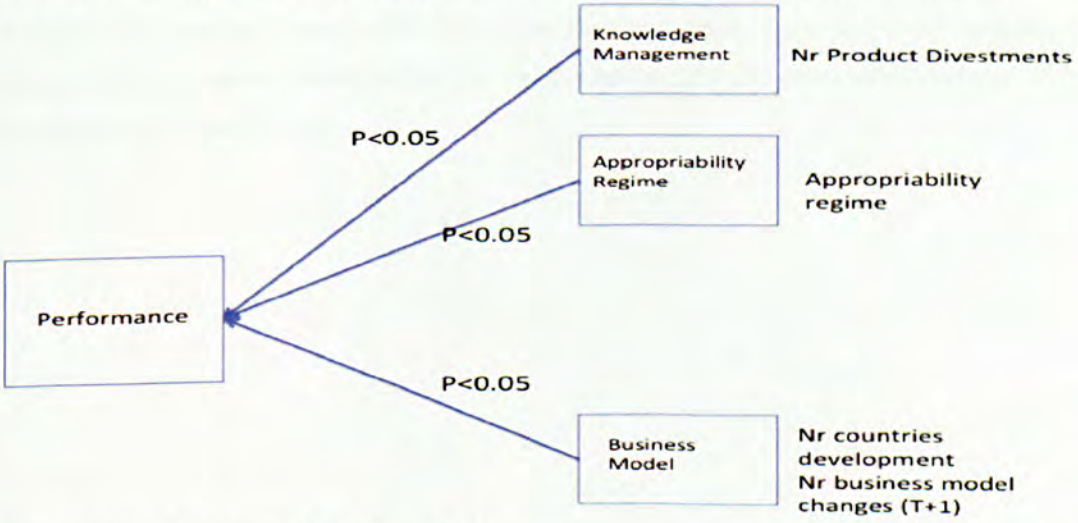

Figure 20 Direct effects mapped onto theoretical framework

The results imply that revenue is significantly (p<.1) impacted by product divestments and by having a tight appropriability regime. However, business model changes will have an impact in the following year.

The output details show that for each product divested there is a significant (ρ<.05) positive effect of $567,723; when time lagged, the effect is much greater, in that for each product divested, there will be a $870,863 increase to the firms revenue. The number of countries used for software development has a significant effect on revenue (ρ<.05), predicting that for each additional country used there is a negative effect of $-74,005. When lagged there is a greater effect of $-86,701. This infers that to increase revenue, the fewer the number of geographical development locations is better for the firm. Having a tight legal appropriability regime has a significant effect (ρ<.05) of $719,403 and $903,228 in T+1. Incorporating business model changes post mergers and acquisitions has a significant effect (ρ<.1) of $201,845 for each additional change adopted in the T+1 model.

My model of organisation behaviours selected, i.e. the dynamic capabilities, the direct effect on revenue post acquisition in the software firm is explained. The next stage is to understand what the same model explains for product integration after the acquisition.

Step 2: Direct effects on Product Integration

Of the ten predictor variables, Figure 21 shows that three have a significant effect (p<.1) on product integration. When I lagged the independent variables by one year I found that the data explained an additional two significant values. The technology competency acquired increases product integration (ρ<.1 y=.82), whilst the related divestment of people decreases product integration by lagged (ρ<.1 y=-1.31). The appropriability regime has a negative effect on product integration (ρ<.1 y=-.62) and a greater effect when time lagged product integration (ρ<.05 y=-1.23). Product integration is positively effected by the number of countries used for sales in both the current year ((ρ<.05 y=.11), and time lagged (ρ<.05 y=.16). The number of countries used for sales and the number of business models changed both increase product integration in the short and longer term. Each time the business model is changed product integration is positively effected (ρ<.05 y=.94), also when time lagged albeit to a lesser extent (ρ<.05 y=.20).

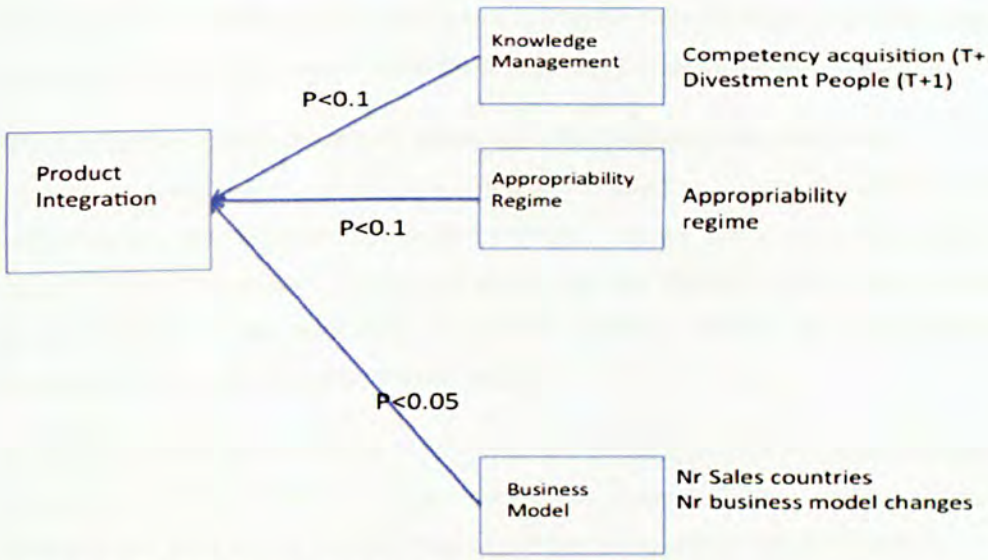

Figure 21 Direct effects mapped onto theoretical framework

These results in Figure 20 and Figure 21 imply that the acquisition of the technological competencies predicts product integration success when time lagged.. Divesting people hinders product integration T+1, implying that business managers will not see the negative effects short term. The acquisition of compatible software hinders development of product integration inferring that the purchase of the compatible software is enough (no further integration required to satisfy the customer). Having a tight legal protection negatively predicts product integration implying that the knowledge required for successful innovation is hindered by it. As the literature suggests, changing the business model and increasing countries for sales is positive for innovation and as such is also positive for product integration success (Helfat and Peteraf, 2003; Pennings, Barkema and Douma, 1994; Teece, 2007).

My model of organisation behaviours selected, i.e. the dynamic capabilities, the direct effect on product integration post acquisition in the software firm is explained.

Step 3: Direct effects of product integration on performance

The results of the Fixed Effect regression model explain the variance of the mediator variable; product integration, to the performance of the firm; revenue.

My findings show that product integration predicts a significant negative effect on revenues ($\rho<.05$, y=$-91,735). When lagged for one year against revenue the loss is reduced but no longer significant ($\rho>.10$, y=$-76,525). Significance is evident on revenue T+1 when product integration is also lagged ($\rho<.10$, y=-$84,530).

These results could conceivably be due to market anticipation. We know that acquisition is seen positively by the finance market but that it hinders innovation (Damodaran, 2004; Hitt et al., 2009; Léger and Quach, 2009)

The final step in the analysis of my model is to test whether there is a mediated (indirect) effect of the dynamic capabilities (independent variables) on revenue through product integration.

Step 4: Mediation effects: the indirect effects of product integration on performance

In order to understand if and how the independent variables transmit an effect on the firm's performance, I have used two consequent variables, revenue and product integration and two causally influencing variables, product integration and the individual independent variables. The simple mediation model tests each independent variables influence on revenue through the intervention of product integration (Hayes, 2013).

As I show in Figure 16, the number of countries used for sales and the numbers of business model changes have no direct effect on revenue but do have a direct effect on product integration. The mediation test confirms that they also have a significant ($p<.1$) indirect effect on revenue.

For product integration T+1, the appropriability regime has an indirect effect on revenue, as does the number of countries used for sales.

These results infer that each country added for sales and each business model change made will indirectly affect revenue through product integration. In other words, after an acquisition, the manager who seeks to work towards product integration will, via these activities (increasing sales locations and changing business models) impact revenues.

Additional Analysis Stages - Robustness Tests

In prior research, performance is measured by many different accountancy calculations. For this reason I wanted to run the tests against return on assets (ROA), earnings before interest and tax (EBIT), Debt to Equity ratio, return on equity (ROE) and logged values. In business practice, the firm (and product managers) are measured on licence revenues. As the variable product integration is made up of new products plus changed products, I want to perform the tests for each one individually. The next section reports on the findings at each stage of the analysis.

Step 1: Direct effects of independent variables on Performance alternatives:

For additional robustness, I ran the performance tests against: log values for revenue, EBIT, return on assets, Debt to Equity ratio, return on equity and revenue from software licences. I chose the accountancy measures that prior studies have used to measure performance (Barkema and Schijven, 2008; Léger and Quach, 2009). The revenue from software licence has been chosen as a specific value that reflects the revenue from software product sales and is reported to the SEC within the annual report. The test results were very similar to those found with Revenue across all performance measures with the exception of licence revenues, which were explained by more of the independent variables. Figure 17 shows the results for revenues. The appendix contains accounting measure tests.

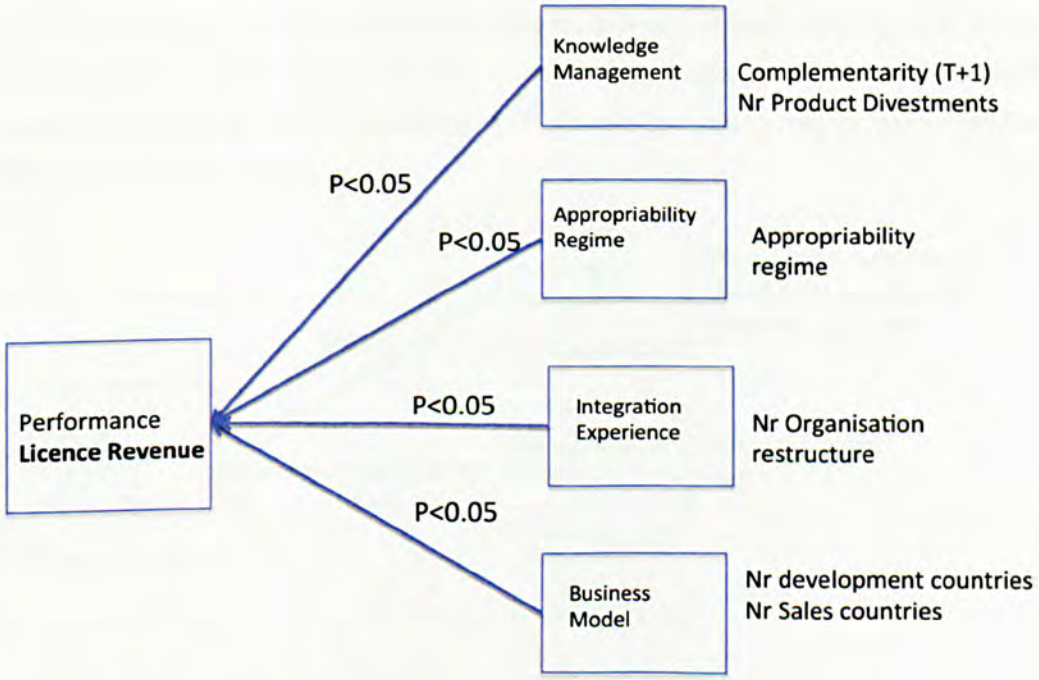

Figure 22 Direct effects mapped onto theoretical framework

These results, as Figure 22 demonstrates, explain that divesting products, having a tight legal appropriability regime and increasing sales geographies infer increased licence revenues. Spreading the software development to multiple countries is also significant, however, it has a negative impact on all revenues.

Licence Revenue: The current and time software licence revenues are positively (ρ<.05) effected by lagged product divestments of $776,026. and $709,733. Purchasing complementary technology has a significant effect in T+1 (ρ<.1 y=$51,784). Having a tight legal appropriability regime has a significant effect of $1,592,377. The model also finds support for organisational restructuring with licence revenues (ρ<.05) of $1,223,962. The number of countries used for software development has a significant effect on current licence revenues of $-315,001. This infers that to increase revenue and licence revenue for software, fewer geographical development locations is better for the firm. Licence revenues are also significantly supported by the number of countries used for sales (ρ<.05) y=$277,139.

The organisation's dynamic capabilities direct effect has been tested on the additional performance models including licence revenue post acquisition. The next stage is to understand if the extended model explains new product development and product change as part of product integration.

Step 2: Direct effects of independent variables on Product Integration alternatives

For additional robustness, I created two product integration dependent variables: new product development and changed products. These were in addition to the combination of new and changed that make up the product integration variable. I ran the product integration tests against all three, shown in Figure 18. In summary, the competency and compatibility acquired, sales countries, business model changes and divestment of people significantly (p<.1) predict new products development. However, only the business model changes and appropriability regime significantly predict (p<.1) product change.

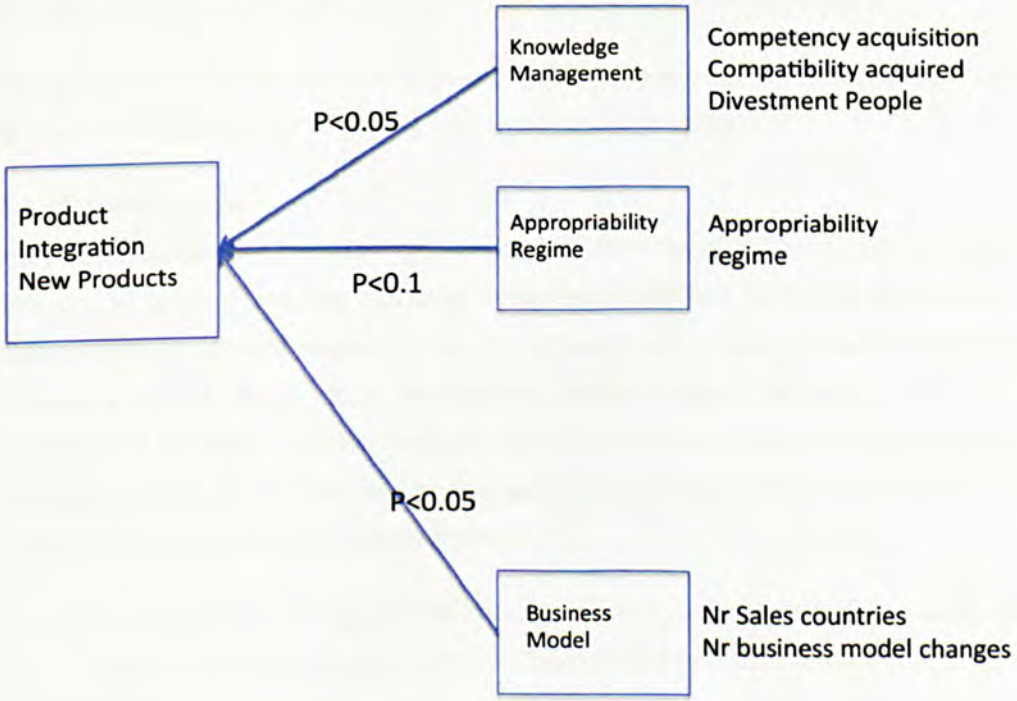

Figure 23 Direct effects mapped onto theoretical framework

The results, as demonstrated in Figure 23 imply that the acquisition of relevant competencies will aid production of new products and will also predict product integration success over time. Acquiring compatible software hinders development of new products and product integration overall. Divesting people hinders new product development. This infers that business managers will not see the negative effects of their decision in the short term.

In detail, the output for this model shows that for the acquisition of compatible software the development of new products is a negatively impact ($\rho<.05$ y=-.50), however if there is an acquisition of relevant competencies, the development of new products is positively impacted ($\rho<.05$ y=0.55). The number of countries used for sales is significant for new products ($\rho<.05$ y=.07). Each time the business model is changed new product development is significant ($\rho<.05$ y=.23). Lastly, the divestment of people has a negative impact on new product development ($\rho<.1$ y=-.48).

The model of the organisation's dynamic capabilities effect on new product development post acquisition in the software firm is explained. The next step tests whether the extended product integration models have an effect on revenue.

Step 3: Direct effects of product integration on performances

Figure 18 shows the results of the Fixed Effect regression model, explaining the variance of the new product development, to the performance of the firm.

Product integration has a significant negative effect on licence revenue ($\rho<.10$, y=$-174,635) that increases when time lagged ($\rho<.10$, y=$-191,008). This implies that the manager working towards product integration will not contribute to the firm or to his licence revenue targets.

New product development has little effect on revenues. Changed products have a negative effect on licence revenues current ($\rho<.1$, y=$-231,148), and T+1 ($\rho<.1$, y=$-256,520).

Step 4: Indirect effects

For the robustness tests I selected revenues received from software licences, as it is an important measure in business practice. A typical performance indicator for the manager will be on achievements of software revenues as a separate performance indicator to the overall company revenue, which will typically include revenue from software maintenance and services. As I show in the Figure 24 mediation tests, four variables have an indirect effect on revenues. Divesting people, the appropriability regime, the sales countries and the number of business model changes. The most impact is reflected on software licence revenues.

1. Mediator - product integration: the business model construct is the only indirectly significant area. Countries used for sales and the number of business model changes effect revenue and licence revenues.

2. Mediator - product integration T+1: Divesting people has an indirect effect on licence revenues. This implies that product managers need to forecast impacts into the following year. However the manager will see some effect on licence revenue and total revenue where sales are made in multiple countries and when a tight legal appropriability regime is in place.
3. Mediator – Changed Product: similar to product integration, business model is the only indirectly significant construct, with the number of business model changes variable effecting licence revenue and licence revenue t+1. Employing Changed Product T+1 as the mediator gives the same results.

Indirect effects summary

Product integration does cause an indirect effect on revenue (T and T+1) in two cases; the countries used for sales and the number of business model changes. For robustness, I ran the tests for logged values, Licence revenues, ROE and Debt to Equity ratios. All the results were similar. The exception was EBIT, which showed no mediation effects. Again for robustness, I ran the mediation tests for product integration T+1, new product development (T and T+1) and changed products (T and T+1). The mediators that had the biggest impact, with the highest mediation results, were product integration T+1 on Licence revenue.

This research demonstrates the complexity in decision making in order to increase revenues after product acquisition. The literature gives guidelines on profiting from technology by identifying behaviours towards creating dynamic capabilities, and this study confirms some of those assumptions, but it is fragmented.

This means the organisation behaviours outlined in the dynamic capabilities theory that work towards profiting from technology are inconclusive in the specific paradigm of software. Some have a direct effect and some an indirect effect on revenues and licence revenues short and long term.

This means that the factors used to measure success for the managers need careful focus. The multiple choices make selecting an outcome and measuring the results very complex.

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Summary of Results

Antecedant	M (Product Integration)		M (Product Integration T+1)		M (New Product)		M (New Product T+1)		M (Changed Product)		M (Changed Product T+1)	
	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.
X1 Compatability_acq	-0.18	0.62	-0.17	0.67	-0.50	0.04	-0.14	0.57	0.32	0.24	0.32	0.24
x3 Competency_acq	0.15	0.74	0.82	0.10	0.55	0.06	0.33	0.27	-0.40	0.22	-0.40	0.22
x4 Related divest people	-0.30	0.47	-1.31	0.01	-0.48	0.09	-0.62	0.03	0.17	0.58	0.17	0.58
x6 Appropriability_Regime	-0.62	0.05	-1.23	0.00	-0.01	0.96	-0.16	0.45	-0.60	0.01	-0.60	0.01
x7 Nr_Org_restructure	0.05	0.79	-0.10	0.65	-0.10	0.46	-0.27	0.05	0.16	0.31	0.16	0.31
x9 Nr_country_sales	0.11	0.00	0.16	0.00	0.07	0.00	0.08	0.00	0.03	0.16	0.03	0.16
x10 Nr_business_model_changes	0.94	0.00	0.20	0.05	0.23	0.00	-0.02	0.70	0.71	0.00	0.71	0.00

Antecedant	(Y) Revenue		(Y) Revenue T+1		(Y) Licence Revenue		(Y) Licence Revenue T+1	
	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.
M Product integration	-91,735	0.04	-76,525	0.12	-174,635	0.05	-191,008	0.05
M Product integration T+1	-63,466	0.13	-84,530	0.07	-220,140	0.01	-220,436	0.02
M Nr New Products	-118,705	0.10	-78,984	0.32	-119,639	0.42	-125,290	0.44
M Nr New Products T+1	-40,929	0.56	-66,041	0.40	-216,509	0.14	-174,018	0.27
M Nr Changed products	-84,283	0.15	-83,632	0.20	-231,148	0.06	-256,520	0.05
M Nr Changed products T+1	-84,283	0.15	-83,632	0.20	-231,148	0.06	-256,520	0.05
X1 Compatability_acq	72,251	0.85	870,863	0.92	680,712	0.37	720,092	0.88
x2 Complementarity_acq	383,890	0.31	577,829	0.17	-379,096	0.62	51,784	0.06
x5 Nr_related_divest	567,723	0.00	870,863	0.00	776,026	0.02	709,733	1.95
x6 Appropriability_Regime	719,403	0.03	903,228	0.01	1,592,377	0.02	1,795,225	2.50
x7 Nr_Org_restructure	-83,742	0.70	-160,442	0.50	1,223,962	0.01	1,008,793	2.15
x8 Nr_country_devel	-74,005	0.01	-86,701	0.00	-315,001	0.00	-352,407	-6.16
x9 Nr_country_sales	32,420	0.36	39,437	0.31	277,139	0.00	308,282	4.06
x10 Nr_business_model_changes	103,875	0.29	201,845	0.06	-312,002	0.11	-418,977	-1.97

Mediation Tests	Product Integration				Product Integration T+1			NEW Prod T+1	Changed Prod		Changed Prod T+1	
	Revenue	Revenue +1	Licence Revenue	Licence Rev+1	Revenue +1	Licence rev	Licence rev+1	Licence rev	Licence rev	Licence rev+1	Licence rev	Licence rev+1
x4 Related divest people	0.63	0.63	0.63	0.63	0.12	0.05	0.06	0.17	0.59	0.59	0.59	0.59
x6 Appropriability_Regime	0.15	0.22	0.17	0.17	0.10	0.04	0.05	0.49	0.12	0.12	0.12	0.12
x9 Nr_country_sales	0.08	0.16	0.10	0.10	0.09	0.03	0.04	0.10	0.26	0.25	0.26	0.25
x10 Nr_business_model_changes	0.04	0.12	0.06	0.06	0.18	0.12	0.13	0.71	0.06	0.05	0.06	0.05

Figure 24 Model estimates - Summary of results

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As noted, the behaviours adopted by the firm impact the outcome but the choices are complex. Some will impact the revenue directly but others are subtler and have a causal effect through product integration. This study has extended the outcome variables and found that the model is better explained. The software house will generate revenue from the creation of new products and from the re-combination of the acquired products into the existing portfolio. However, the benefits will be acquired indirectly.

With the exception of complementarity, all of the selected organisational behaviours in the model have a significant direct effect on the key outcome measures; namely: product integration, (new / changed product development) and revenues.

The indirect effect tests further explain that revenue is impacted by:

- Knowledge management in the divestment of people – this effects licence revenues via product integration in the longer term.
- Appropriability regime effects revenue in the longer term through product integration in the following year. Licence revenues are also effected by product integration T+1.
- Business model behaviours reveal the most indirect effects – impacting revenues and licence revues via product integration, new product development and product change.

Conclusions and Discussion

In this section of the thesis I will discuss the extent to which the business problem has been addressed by the theoretical model. Having laid the foundations of current work on the theory and academic literature that contribute to my research I will confirm or contradict it. I will structure the discussion with relevance to the business problem solved. Firstly the dynamic capabilities followed by the themes of knowledge management, appropriability regime, integration experience and business model

I have developed a study with the dynamic capabilities of the firm at its core. I show that the dynamic capabilities paradigm contributes to the ideas about coordination and complementarities in line with ideas developed by Augier and Teece (2009) and Teece (1997; 1980; 2007). I have extended the post mergers and acquisition literature in high technology by considering the mediation effects of product integration innovation on performance. In line with prior findings, I have sought to understand whether synergies (product integration) are achieved (Barkema and Schijven, 2008) and their effect on revenues (Makri, Hitt and Lane, 2010). This earlier work has informed my model for testing and in line with prior studies, I replicated some of the findings. I have also leveraged business practice and measured revenues specific to it.

In extant work, researchers have almost invariably treated acquisitions as isolated events; implicitly assuming that an acquirer can start with a clean slate every time it acquires. In reality, however, an acquisition usually represents merely one element in a broader sequence of acquisitions collectively intended to implement some corporate strategy (Barkema and Schijven, 2008; Damodaran, 2004).

My model uses measures drawn from organisation behavioural theory (Barkema and Schijven, 2008; Teece, 2007), shaped in the dynamic capabilities framework that reflect the behaviours required by a firm in order to profit from technological innovation and to address the enterprise's changing environment (Augier & Teece, 2008; Teece and Pisano 1994; Teece et al. 1997).

The dynamic capabilities within my research have been specifically chosen towards the firm's redeployment and reconfiguration. This involves business model redesign as well as asset-realignment activities, and the revamping of routines. The redeployment was expected to involve the transfer of non-tradable assets to another organisational or geographic location (Teece, 1977, 1980). It often involves divestments. I found that when the firm redesigns their business model and geographic locations, their revenues are significantly impacted. Although I echo the findings of Helfat and Peteraf (2003) who explain that capability redeployment takes one of two forms: the sharing of capability between the old and the new, and the geographic transfer of capability from one market to another. Both are possible, but neither is easy. The results for additional countries used for sales and development cause a dichotomy for the manager of the product and for the manager of the business.

After a software company has acquired another software company, the firm has acquired products as well as the people that have knowledge (tacit as well as documented) about the products. Managers then endeavour to reconfigure the firm's portfolio of products so as to meet customer needs. Using product integration to explain the development of new product creation to satisfy customers, post mergers and acquisitions, I have found that product integration innovation does have an effect on revenues, albeit a negative one. Clearly, there may be market benefits to having new products and we understand that if a firm is to differentiate itself from its competitors, it must provide a product (or service) to its customers that is in some way superior to that of its competitors (Xu, Huang and Gao, 2012).

If the assertion that within high technology markets the integration of new products has become a strategic necessity and customers place increasing value on cross product integration (Nambisan, 2002a) is a given, then I have found that the route to its achievement needs careful consideration. The impact of the firm's capabilities to embed acquired knowledge in new goods and services (product integration), and launch products and services into the market (innovate), and moreover, the firms ability to increase revenues to the firm, post acquisition, may seem detrimental to some managers whilst it is beneficial overall. For example, business model changes enhance the revenues to the firm directly but also increase likelihood to product integration, which indirectly reduces revenues - with a net result of an increase in revenues. Thus changing the business model is beneficial overall.

My study has shown that aspects of knowledge management, the appropriability regime used and changes to the business model influence the ability of the firm to reconfigure and combine products, and so innovate. This innovation, in terms of product integration, also influences revenues.

Knowledge Management

The examined literature related to mergers and acquisition in knowledge worker intensive organisations draws heavily on knowledge systems and the management or integration of them (Augier and Teece, 2009; Cloodt , Hagedoorn and Van Kranenburg, 2006; Gates and Very, 2003; Grimaldi and Torrisi, 2001; Léger and Quach, 2009; Teece, 2007).

Figuring out how to increase value from the use of the people as well as products in the software business, that the enterprise owns, involves understanding the granular detail of the firm's asset base, and filling in the gaps necessary to provide superior customer solutions. This is where gap filling may involve building new knowledge bases (assets), or disposing of assets (people). I have found that the acquisition of compatible product(s) does affect product licence revenue in the longer term and reduces the firm's ability to innovate. This may imply that the need for the manager to determine how to use the acquired product is reduced if it is already compatible; i.e. *"the extent to which programs can work together and share data. In another area, totally different programs, such as a word processor and a drawing program, are compatible with one another if each can incorporate*

images or files created using the other. All types of software compatibility become increasingly important as computer communications, networks, and program-to-program file transfers become near-essential aspects of microcomputer operation" (Microsoft, 2002, p.115).

As the act of acquisition is the beginning of a large project, the majority of which is the integration of the acquired firm (Gates and Very, 2003) in his explanation of dynamic capabilities, Teece (2007) finds that the ability to integrate and combine knowledge assets is a necessary capability in gaining performance. Following an acquisition, there is specialist knowledge within both the acquirer and the acquired firms, contributing to heightened levels of conflict. The ability towards coordinating, learning, product combining and reconfiguring is key to sustain performance (Teece 2007). I have found that acquiring and divesting competencies (people) affects the firm's ability to innovate, as might be expected. This perhaps reflects the finding of Teece, Pisano and Shuen (1997) whom propose that it is management leadership skills that are required to sustain dynamic capabilities; namely coordination and integration, learning and reconfiguring that make the difference.

The most valuable assets inside the firm are knowledge related and complex. Within a software house, a large body of the non-administration staff are technicians, analysts and programmers. The coordination and integration of such assets create value. The post acquisition findings are grouped into asset acquisition and divestment.

Knowledge management: **Technology Compatibility**

In this study I have found that the acquisition of software compatibility negatively affects new product development but does not significantly affect revenues. The product integration findings reflect Léger and Quach (2009) who state that post mergers and acquisitions, if the products owned by the firms involved in the merger are compatible, it should reduce the investments the new entity needs to make to market a unified product portfolio. In addition, software compatibility can be perceived as a benefit for customers in the sense that it allows the joint use of software and thus gives access to new functionalities without making any additional investment. In other words, in addition to conferring technical advantages, compatibility is directly related to financial investment; the more compatible the software products are, the lower the financial investment required to make them work together. However, software compatibility is not adding to the revenue, probably for the same reasons, i.e. the customer benefits from the use of new functionality without making additional investment.

Knowledge management, **Technology complementarity**:

Reflecting the findings of Léger and Quach (2009) which implied that the lack of market attention in the portfolio acquired may impact the product integration capability through lack of management or business drive, I have found there to be no significant effect on product integration. In other words, the acquisition of complementarity does not mean that the portfolio will change. This is where

software complementarity is defined as compatible programs that are based on the same standards and require few or no investments to make them work together (Léger and Quach, 2009).

I did find there to be a positive impact on software licence revenue in the longer term when the acquisition made has complementary technology; there was not a significant relationship to total revenue, and a negative impact on licence revenue in the short term, albeit not significantly. It also may reflect the difficulty in getting a good fit regarding the level of complementarity - Makri, Hitt and Lane (2010) found that too much similarity or too much difference reduces innovation (the process of recombination, re-combining in a novel way) in technology firms. Similarly Cloodt, Hagedoorn and Kranenburg (2006) found that an important factor in the merger of two firms is their relatedness in terms of particular fields of technology (that the acquiring firm shares with the acquired firm). However, technological knowledge and engineering capabilities that are too similar to the already existing knowledge of the acquiring company will contribute little to the post-M&A innovative performance. As I have focused this study on highly acquisitive high-technology software firms, my findings possibly reflect the similarity that must be present to some extent with technology. This could explain why complementarity has no impact on product integration innovation.

Knowledge management, **Competency**:

The acquisition of competencies in the software industry measured in this study is the acquisition of technical know-how or specific technologies, which are difficult to imitate or copy and which would require a corresponding financial investment (Léger and Quach, 2009). Gammelgaard (2004) argues that access to competence (non-tradable, unique resources) is a motive for mergers and acquisitions. Ahuja and Katila (2001) agree. Acquisitions are an important part of the business process of redeploying resources into more productive uses and through the acquisitions, the firm specific assets housed within one organisation are merged with assets in another to improve productivity.

I have found support for the acquisition of competencies having a positive effect on innovation; on product integration in the long term and for new product development in the short and long term. This reflects the assertion by Cloodt, Hagedoorn and Kranenburg (2006) that the companies are integrating the acquired knowledge (competencies) to improve the post-mergers and acquisitions innovation. This integration process forms the second critical dimension in the unification of two firms. Hitt *et al.* (2009) posit that innovation success, post mergers and acquisitions is predicated on organisational learning.

My findings show that revenues are negatively affected (not significantly) which may be a reflection of the work by Ahuja and Katila, (2001) who find that integrating a relatively large knowledge base requires additional resources to be devoted to integration activities, leaving fewer resources for the actual innovative endeavour, and which has a negative impact on the acquirer's post-M&A performance.

To achieve competitive advantage within the dynamic capabilities framework, a key skill is the ability to reconfigure and protect knowledge assets competencies and complementary assets. Within business environments open to global competition, firm's rely on owning the knowledge assets as well as enhancement, combining and reconfiguring the difficult-to-replicate assets (Augier and Teece, 2009; Grimaldi and Torrisi, 2001; Teece, 2007). One of the main performance antecedents identified by Léger and Quach (2009) in post-merger performance in the software industry, is the potential to acquire competencies. The acquisition of competencies has the goal of acquiring skills that are difficult to develop internally or would take too long, meaning that this factor may be crucial to the success of the new entity. Prior studies as well as financial literature have largely analysed mergers and acquisitions with relation to shareholder value creation (Léger and Quach, 2009), whilst I have used the firm's revenue. As explained by Damodaran (2004), findings imply that the shareholder view adds to the firms' premium in the market. Within the industry, SunGard is an example of a firm that echoes this and is striving to achieve endogenous growth. My findings indicate that the acquisition of competencies does not effect revenues but does effect product innovation.

Knowledge management, **Divestment:**

In order to solve problems and avoid limitations in innovation, managers that divest assets may end up winning in the marketplace (Teece, 2007). Divestments in the context of this study refer to changes in the scope of the firm (Barkema and Schijven, 2008) and the firm's capability towards divestment, which is that of redeployment and reconfiguration and involves the firm's decisions regarding asset realignment (Capron, 1999; Teece, 2007). Post acquisition, a firm may need to reorganise and reconfigure its assets and also consider the products and boundaries of the firm that are no longer viable. Especially in a technological setting, the divestiture may be fragile and exiting the firm boundaries may not be obviously rational (Hitt *et al.,* 2009; Teece, 1986, 2007). Moreover, divestments are often part of portfolio restructuring (Barkema and Schijven, 2008).

Capron (1999) found that asset divestiture and resource deployment could contribute to performance. I have also found that product divestment has a direct positive relationship to revenue, in the short and longer term. However, product divestment did not help the innovative process of product integration. This is not in line with Teece (2007, p.1335) who would expect that the freeing of dying systems and technologies allows for removal of innovation limitations. My findings are however, in line with the market, in that Damodaran (2004) has found the divestiture rate of acquisitions rises to almost 50% of prior acquisitions made supporting the view that as Barkema and Schijven (2008) suggest, few firms enjoy the promised benefits from their prior acquisitions.

Within the dynamic capabilities model, an important managerial function is achieving semi-continuous resource asset orchestration. This is because the sustained achievement of superior profitability requires efforts to build, maintain, and adjust the complementarity of product offerings. In short, inside the enterprise, the old and the new must complement. If they do not, business units

must be disposed of (Teece, 2007). Conversely, and perhaps intuitively, I have found that the divestment of people has a negative effect on the innovative process of product integration. It also has an indirect effect on licence revenue in the short and long term.

The divestments are part of the product portfolio restructuring and are common when there are major changes in the scope of a firm through, for example mergers and acquisitions. A regular occurrence in highly acquisitive firms, undertaking organisational restructuring refers to the recombination of existing company departments that leaves the scope of the firm unchanged and is required to unlock synergies contained within the acquisition. As previously stated, the bottom line on synergy is that it is exists, or, is extracted in relatively few mergers and acquisitions and therefore it often does not measure up to expectations.

Appropriability regime

The concept of the appropriability regime helps explain how income from innovation and sources of performance can be protected from competitors and others. In the Teece (2007) dynamic capabilities framework, the appropriability regime's strength is an indictor to competitive advantage, and therefore performance.

The appropriability regime is categorised into two groups, weak and tight. A tight regime regards the legal dimensions; copyrights, patents and trade secrets are commonly used in technology firms. In knowledge-based technology industries, the degree to which knowledge is tacit or codified may be the appropriability regime, as it can be an effective way to stop imitation from competitors. (Teece, 1986; Teece, 2007; Xu et al., 2012). Again, there seems to be no simple answer. I have found that a tight legal appropriability regime has a directly positive effect on revenues in the short and longer term and a negative effect on product integration. When mediated by product integration in the following year, there is an indirect effect on licence revenues.

This could mean that the customer wants to know that there is software protection, i.e. the reassurance that the literature discusses. It also reflects the dilemma of the necessity of protection and the reassurance to the market that the software product is protected, versus the agility required to combine and reconfigure in order to integrate software products. Teece (2004) argues that if the appropriability regime is weak there is greater flexibility and therefore greater value creation opportunities although the firm is then exposed to risk of loss to competition. A tight regime may infer that a firm has competitive products that need protection and that they are able to retain that advantage. Business practice in the software market is mixed. This is in line with the dynamic capabilities framework and prior research (Grimaldi and Torrisi, 2001; Teece, 2004; Xu, Huang and Gao, 2012).

Integration experience

Barkema and Schijven (2008) find that the post acquisition integration and restructuring cycles evolve over time, as a firm gains experience with acquisitions and restructuring. They note that it is quite common for firms to use organisational restructuring as a means of experimenting with structure to find more promising configurations (Barkema and Schijven 2008; Karim, 2006). The term Product Integration is directly related to the transformation of the software product portfolio held by the firm, post mergers and acquisitions (Léger and Quach, 2009; Nambisan, 2002a). As the acquisition is usually not an isolated event, but just one part of an overarching sequence of acquisitions collectively aimed at implementing a corporate strategy (Barkema and Schijven, 2008), I have used a count of the number of organisation restructures for the integration experience as a measure towards success of product integration.

As mergers and acquisitions add a new dimension to the firm, an argument posed by Barkema and Schijven (2008) is that even with pre-integration preparation, initial integration is, nevertheless, suboptimal. As a result, acquisitive growth decreases an acquirer's performance, eventually forcing it to engage in organisational restructuring to more fully unlock the synergistic potential. In studying the effect of multiple acquisitions in conjunction with the number of reorganisations over time, they found that organisation restructure is used to increase performance. Contrarily, I find a direct relationship to organisation restructures, in that they reduced total revenues, while increasing product licence revenue. This may be because I am measuring revenue as opposed to an accounting measure based on assets, which are generally reduced.

The literature suggests that the benefits of acquisition experience enables an acquirer to increase its acquisition performance and indicate that firms can develop a restructuring capability, although extant theory predicts that it is difficult for them to do so, since restructurings occur infrequently and are highly heterogeneous and causally ambiguous (Zollo & Winter, 2002 in Barkema and Schijven, 2008). Although organisational restructuring tends to be a traumatic event that leads to a substantial dip in firm performance in the short term (Amburgey et al., 1993; Greve, 1999, cited in Barkema and Schijven, 2008), Barkema and Schijven (2008) assert that in the long term it enables a firm to more fully unlock the synergistic potential of its acquisitions and thus, to increase its performance to higher levels than before. I echo the difficulty, finding that organisation restructures do not aid overall revenue but do aid product licence revenues. Conversely, they reduce innovation efforts.

Organisation restructures infer a classic manager's dilemma. I have established that the number of organisation restructure events increased performance of the licence revenue directly in the short term and hence are good for the product manager. This is also the case in the following year, although not significantly. The effect on overall revenue was negative although not significantly. This is in line with early research that a restructuring event leads to a dip in performance of the firm, but agrees with the findings of Barkema and Schijven (2008) in terms of product licence revenue,

although this is in the short term and not the long term. New product development is negatively affected and so bad for the product manager.

Restructuring experience impacts the number of product integrations positively in the short term and negatively in the longer term, although not significantly. This may reflect the restructures impact on the combination and integration capabilities that impact in the longer term. This is in line with the dynamic capabilities model explanation from Augier and Teece (2009), that managers effectuate the deployment and redeployment of resources, typically in response to price signals. In short, the strategic, organisational, and human resource decisions made by management lie at the heart of enterprise performance. Success requires that managers behave in an entrepreneurial manner and build in the capacity to transform and reconfigure as opportunities and competitive forces dictate. Not many CEOs have the necessary skills, and fewer still succeed in building them into their businesses, which would go towards an explanation of the lack of performance in terms of revenue and product integration.

Business Model

It is argued that strategic renewal is a key driver for mergers and acquisitions. The element of strategy is the impact on the business long-term while the renewal is due to the refresh of the business and thus changing the business model (Agarwal and Helfat, 2009). Teece (2007) agrees that the long-term performance of the firm does not rely on scale or scope alone. For success, the business needs to constantly hone new products and business models. These will enable the firm to stay ahead rather than being shackled to the past. Teece (2007) asserts that there is considerable evidence that business success depends as much on organisational innovation, that is to say, the design of business models, as it does on the selection of physical technology.

Changes to the business model have the widest impact within my study. The business model explains:

- Changes to the revenue structure of a business including changes to the sales locations and changes to the sales channels.
- The changes in the number of locations in which technologies are to be assembled.
- The changes in the identity of market segments to be targeted. This includes the client type and the target market.

Adding to the number of software development countries reduces revenues directly but has no significant impact on product integration innovation. Adding to the number of countries used for sales increases licence revenues in the short term and product integration in the short and long term. This could be that the acquisition has opened a new market or a new opportunity with country (regional) know-how in a new country for sales, thus increasing revenues. The decrease in performance when development is undertaken in additional countries is less obvious. Through

mergers and acquisitions activity, the acquiring company may alter the geographic scope of the firm, which tends to affect firm performance (Hitt et al., 1997). The company may gain efficiencies resulting from the expansion of the scope (Léger and Quach, 2009) and the dynamic capabilities required are heightened as because the global economy has become more open and the sources of invention, innovation, and manufacturing are more diverse geographically and organizationally (Teece, 2000).

In addition to geographies, I have found that changes to the business model positively effects innovation in product integration in the short as well as long term. The business model changes also directly affect revenue positively in the long term. There is an indirect effect on total revenue as well as software licence revenues in the short and long term. This reflects the literature in that the business model defines the manner by which the firm delivers value to customers and entices customers to pay for that value.

This finding supports the dynamic capabilities framework in that adjusting and improving the business model are likely to be critical to commercial success. It involves distilling insights into customers and markets. Thus, business model choices involve market segments to be targeted, customer types and revenue capture methods (Chesbrough and Rosenbloom, 2002; Teece, 2006).

Summary

The theoretical model utilised in this research has allowed me to describe, explain and account for the effect of product integration on the firm's performance. Moreover it has examined the organisation capabilities that impact the acquiring firm's performance and synergy achievement of product integration post acquisition.

Drawing on prior theories, the nature of this research is set within the dynamic capabilities 'Enhance' stage of a merger or acquisition. In other words, concerning the firm's endogenous growth within the post mergers and acquisitions decision and action event. The research uses public software firms that are highly acquisitive; competing in larger markets and needing to recombine and reconfigure to remain competitive.

Concentrated on capabilities within organisational behaviour theory (Barkema and Schijven, 2008; Teece, 2007), my research centres on mergers and acquisitions synergistic achievement by measuring the factors that impact product integration innovation post mergers and acquisitions and whether the performance potential from a software product acquisition is enhanced with or via Product Integration.

I have found that post acquisition:

- Revenues are indirectly affected by the causal values of product integration(s) and a subset of the behaviours.
- Product integration, new product development and product changes negatively impact the performance of the firm.
- The outcome variables (revenues) and the mediator variables (product integration(s)) are affected by a subset of the behaviours.

The results of the analysis are complex, as reflected by the extant literature. The manager must undertake a high level of orchestration to the organisation's behaviours. For example, managing the modifications to the business model that indirectly infer an increase in revenue and an increase in product integration. Whilst noting that an increase in product integration indicates a reduction to revenues, even though the net result of the business model changes look positive the manager needs to be aware of this as part of his decision-making.

In Figure 25 below I illustrate the short and long term significant values of the direct effects of the organisation behaviours on product changes (ChngPrd, ChngPrdT+1), new product development (NewPrd, NewPrdT+1) and product integration (Prd Int, Prd Int T+1).

In Figure 26 I summarise the moderated effects of (X) the significant organisation behaviours: the divestment of people, appropriability regime, countries used for sales and the number of business model changes. On (Y) performance, namely, revenue, revenue t+1, Licence revenue, licence revenue

t+1. Through (M) product integration, namely, product integration, product integration t+1, new product development, changed product and changed product t+1.

With these figures I demonstrate that acquiring compatible technologies, divesting people and employing a tight appropriability regime infer a decrease in innovation activities in the short and long term and echo prior studies (Hitt et al., 2009; Léger and Quach, 2009; Nambisan, 2002a). Changing business model increases innovation, as does competency to a lesser degree.

Extending country locations and changing the business model has the greatest positive effect on product integration innovations as predicted by the dynamic capabilities framework (Augier and Teece, 2009; Teece, 2007). The appropriability regime and people divestment have longer term impacts. Extending and changing the business model also directly impact revenues indirectly through product integration.

Product integration values for significant direct effects

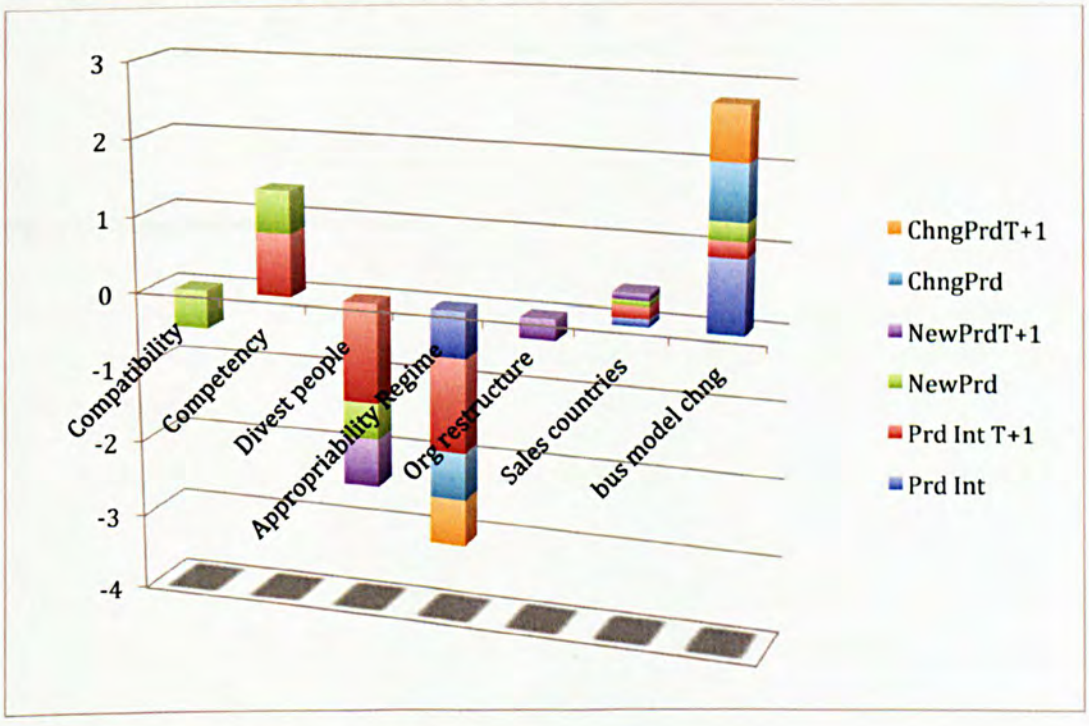

Figure 25 Chart of Product Integration Direct effect results

Mediation p values for significant indirect effects

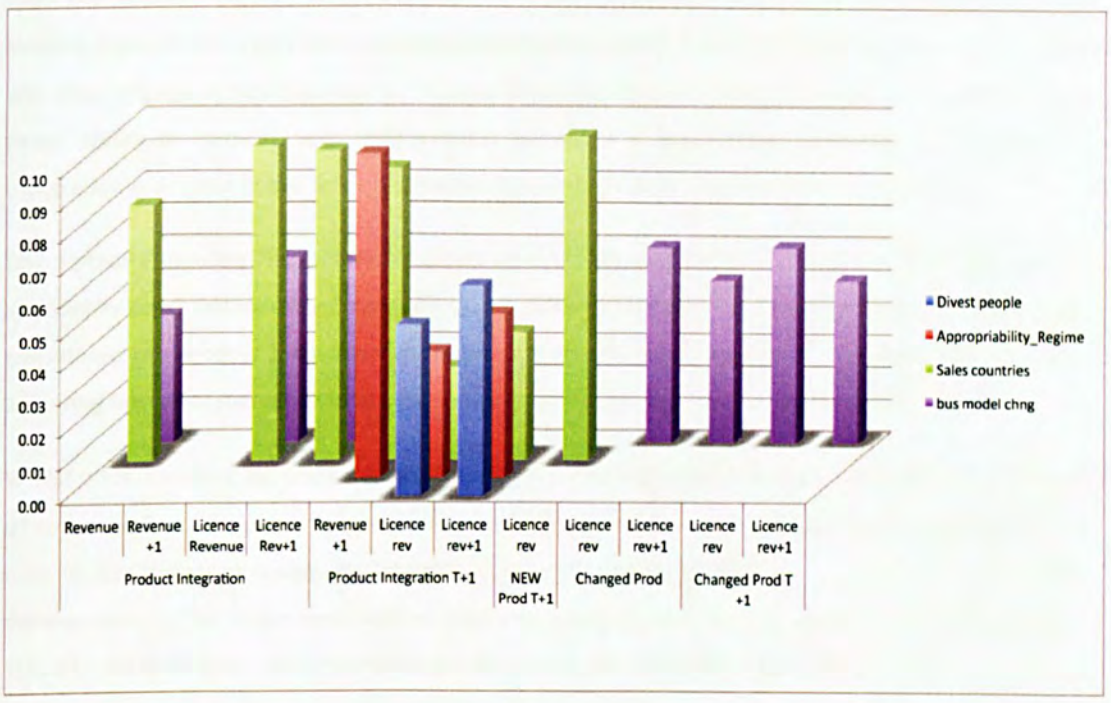

Figure 26 Chart of Mediation Effect results

Contributions

My study sheds light on strategy implementation post acquisition that has been overlooked for the most part in prior research. Whilst the majority of earlier research treats acquisitions as a single event starting from scratch every time, I have collected data on firms that are using acquisition as a strategy and thus engage in multiple events. I argue that exercising dynamic capabilities can enhance the firms' ability to innovate with their product portfolio. A key implication is that post acquisition integration is a factor in the firm's realisation of synergies (Barkema and Schijven, 2008).

The software industry has entered a phase of maturity and there are relatively few studies that specifically cover this industry (Léger and Quach, 2009). Moreover there has not been a study that has considered the product innovation characteristics as a factor in explaining the performance of the acquiring firm after mergers and acquisition events. This is important for the software industry.

Whilst prior literature has shown a positive effect on market prices, I have found that the importance of software firms acquiring software competencies, technology compatibility and complementarity have limited impact on revenues. Only competency has a positive effect on innovation in new product development in the longer-term whilst complementarity adds to licence revenue in the longer term. This corroborates prior work that the acquirer may pay a premium for a compatible entity, but fails to realise product integration synergies (Léger and Quach, 2009).

My study also extends prior work in the field of dynamic capabilities and the role of managers towards business strategy and economic performance. By applying my model to revenues rather that market prices I have focused on the firm's endogenous growth, which is an industry driver for highly acquisitive firms.

This study as taken the dynamic capabilities recombination and reconfiguration stage and empirically tested for the performance.

Many of the hypotheses were supported. The changes to business model had the biggest impact to revenues and product integration. This supports the cornerstone of the framework:

"Dynamic capabilities include difficult-to-replicate enterprise capabilities required to adapt to changing customer and technological opportunities. They also embrace the enterprise's capacity to shape the ecosystem it occupies, develop new products and processes, and design and implement viable business models. It is hypothesized that excellence in these 'orchestration'₂ capacities undergirds an enterprise's capacity to successfully innovate and capture sufficient value to deliver superior longterm financial performance." (Teece, 2007, p.1320)

Similarly the appropriability regime had a significant impact on all measures of product integration and performance. The appropriability regime relates to the amount of legal protection afforded to the product integration (innovation) and this demonstrates that it is likely to ensure that any

innovations will benefit the software developer. In high tech firms undergoing rapid change, the framework asserts that setting the firm's boundaries are key. This is a key element of the framework (Teece, 2007, p.1331). The appropriability regime also acts as a governance issue as it encompasses the aspects of knowledge leakage by codifying intellectual property, particularly in a knowledge based industry.

The integration of know-how is especially important after mergers and acquisitions in the software industry and is key to the dynamic capabilities framework. My findings in this section were the most complex for the manager. This is perhaps not surprising as these elements relate directly to people skills related to product.

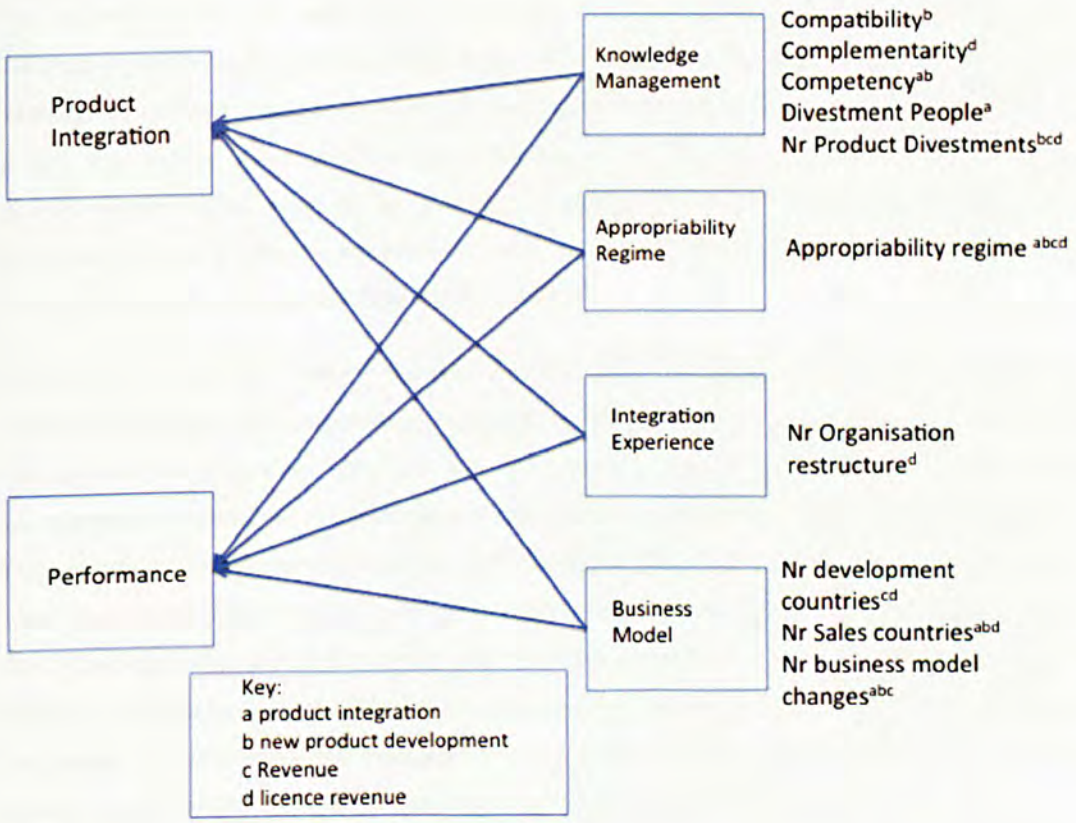

Figure 27 Direct effects supported

This means that my study has found that the dynamic capabilities theory is relevant to the high tech software industry and that the framework can be utilised analytically into the third stage, i.e. the transforming section. Based on the supported hypotheses, the framework is a useful tool to measure resource-based assets in a dynamic market.

Lastly, I believe that my study adds richness to the well-established finding that acquisitions fail to realise anticipated synergies. I have found insights that show over time, capability development determines the outcomes for product integration and performance, albeit strengthening or weakening.

Managerial Implications

I believe that my theoretical framework and empirical results have important practical implications. Post acquisition integration requires the manager to orchestrate the knowledge base of the firm, balancing the acquired knowledge assets with their disposal. Whilst the disposal of product may look attractive, if it involves the disposal of people the anticipated performance gains may be negated.

The manager must also look to redesign the firm via changes to the business model. Again the opportunity to operate in new countries brings gains when they are used for sales, but losses when product development is spread too thin. In essence the manager must contemplate the long-term indirect influences to performance of the capabilities that they are building.

The research echoes prior work that discusses the managerial impact of dynamic capabilities; the business organisation is a complex entity, and understanding and improving its performance as well as designing strategic processes involves creating internal organisational methods. The manager plays a key role in the asset selection and coordination of economic activity, particularly when complementary assets need to be assembled (Augier and Teece, 2009). The manager must orchestrate assets, and design and implement new business models, which define the architecture of new businesses (Chesbrough and Rosenbloom, 2002).

The findings explain that there is a negative effect on performance when product integration is achieved. This means that policy makers must not only understand the orchestration required to work on the product integration task, but also the conflicts present. For example, having a tight appropriability regime shows an increase in revenues but a decrease in product integration. And product integration also reduces revenue. The assumption might be that product integration is a bad idea, however the firms strategy is often to complete product integration for their customer base and their standing in the market. This means that the manager needs to have clear policies and explain the impacts of the firm's strategy to extract synergies from the mergers and acquisitions. The findings also explain the dichotomy the manager faces in a public company where the quarterly financial results must be positive and the business drivers (product integration) act against it.

Within the software industry it is critical for firms' to innovate and integrate product portfolios (Nambisan, 2002a) and those companies that are highly acquisitive are aware that they have a high risk of not being able to realise this goal (SunGard, 2009). This study gives additional insights into the capabilities management needs to develop towards product integration and thus endogenous growth.

Limitations and recommendations for further research

There are several limitations to this research. Only US firms were taken into consideration because of the volume of firms and data availability. It is therefore not necessarily possible to generalise these results to European and Asian businesses, as they may have different approaches. My study is specific to the software industry and may not be generalizable to other high technology industries. Similarly, these findings may not be generalisable to many companies with large software departments and who also extensively undertake mergers and acquisitions.

Whilst in line with prior work, it should be noted that the instruments used to measure acquisition factors in this study have certain inherent limitations. First of all, some of the measurement is based on public information or, in other words, 'secondary data.' In addition, the qualitative variables used in this study were measured on a limited scale of intensity. Although the use of a more precise scale would have allowed for greater discrimination, it would also have increased the subjectivity applied in assessing fairly general information. Furthermore, I did not take market reasons or the organisation strategies into account for negative effects of product integration on performance. Likewise, the organisation restructure types could be used to further explain the results.

Whereas in line with prior work I have used the number of countries to measure the impact of locations, future research could take account of the country location (country itself and region) as well as the number of countries employed. Similarly, I have counted the number of product integrations; further research into the taxonomies of product combinations (for example complementary or substitute) could add benefit to the manager.

In line with prior work I have used the number of employees as a proxy for the size of the firm. In future research the size of R&D and their relative size to each other could be a useful measure to account for innovation capabilities. I have also used one measure for product integration. Future research could collect data and measure whether the product integration is more likely amongst substitute or complementary products.

My study suggests that it is important for future research to move beyond the notion of acquisitions as isolated events toward recognising their embeddedness in sequences intended to implement a corporate strategy, which allows for a long-term and dynamic approach to studying their performance effects. One suggestion would be to refine my theory by studying acquisition sequences in greater detail (e.g., using year-by year trajectories rather than simple counts). Another approach would be to complement the strengths of archival data with those of survey data. Although extensive time series of archival data were necessary to test my theory, since acquisition- cycles span long periods of time, I unsurprisingly missed out on the distinctive advantages that survey data offer. For instance, survey data, unlike my archival data, would allow the study of acquisition integration more directly, and create finer-grained operationalisations of the organisational experiences and behaviours employed in product integration.

The results I have created are likely to be important to other high technology industries and to companies that have a high dependence on software integration. Future research may offer a valuable understanding of the efficacy of market insights in to the success of product integration. The firm's technology strategy may impact the behaviours in my model, thus a future research could also add the technology strategies as a moderator to the organisation behaviours impact on product integration.

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Appendices

Glossary

Mergers and acquisitions	Distinction between Mergers and Acquisitions is increasingly blurred. Whether a purchase is considered a merger or an acquisition really depends on whether the purchase is friendly or hostile and how it is announced. In other words, the real difference lies in how the purchase is communicated to and received by the target company's board of directors, employees and shareholders. The key principle is to create shareholder value over and above that of the sum of the two companies (Investopedia.com).
Endogenous	Internal. The endogenous growth theory approach adopted by Penrose (2009) reinforce that internal processes and policies affect growth. Dynamic capabilities are centred on this theory, Teece (2007) criticises earlier strategy models such as the Five Forces Framework as being externally based (exogenous), whereas market structure is based on innovation and learning (endogenous).
Endogenous Growth	Growth from internal resources. Some firms use the term organic growth.
Invention	Creating a new product. In this context, invention refers to the development of a new idea and the establishing of property rights on that idea, for example by patents.
Innovation	Commercialisation of an invention. Taking an invention and creating a route to market. Orchestration of multiple skills are required (Teece, 2007).
Product integration	An innovation. Combining products to create something new and then commercialising it.
Organic Growth	this is used by business to describe growth from internal processes and policies (Endogenous). For example SunGard (2010, p.11) state: "To complement our organic growth, we have a highly disciplined program to identify, evaluate, execute and integrate acquisitions".
Bounded Rationality	When managers make decisions, their rationality is limited by the information that they have. Pierce and Teece (2005) explain that the bounded-rationality view of organisational expectations found in

behavioral, evolutionary, and dynamic capabilities theory owes its development to the insights of Simon (1955, 1957).

Company Classifications

The Global Industry Classification Standard (GICS) is an industry taxonomy developed by Morgan Stanley Capital International (MSCI) and Standard and Poor's (S&P) for use by the global financial community. The GICS structure consists of 10 sectors, 24 industry groups, 68 industries and 154 sub-industries into which S&P has categorized all major public companies. The system is similar to Industry Classification Benchmark (ICB), a classification structure maintained by Dow Jones Indices and FTSE Group (FTSE). GICS is used as a basis for S&P and MSCI financial markets indexes in which each company is assigned to a sub-industry, and to a corresponding industry, industry group and sector, according to the definition of its principal business activity (MSCI, 2002).

The ICB is an industry classification taxonomy launched by Dow Jones and FTSE in 2005 and now owned solely by FTSE International. It is used to segregate markets into sectors within the macro economy. The ICB uses a system of 10 industries, partitioned into 19 supersectors, which are further divided into 41 sectors, which then contain 114 subsectors (FTSE, 2011). The ICB is used globally (though not universally) to divide the market into increasingly specific categories, allowing investors to compare industry trends between well-defined subsectors

Bloomberg has created its own code; BICS, Bloomberg Industry Classification Standard

For completeness, I collected data on US domiciled software firms from ICB, BICS and GICS. I then compared the results and noted each of the differences. I then checked the companies via their website to determine variances, and found that the companies included in ICB that are not in GICS are primarily involved with Technology, rather than software. For example, Acorn is Energy delivery; Cerner is technology equipment for hospitals etc. Similar results were found from the BICS Bloomberg code.

GICS missing from BICS	BICS missing from GICS	ICB missing from GICS	GICS missing from ICB
bottlomline	Activision	Acorn Energy	Augme
broadsoft	Acxiom	Allscripts	Cinedigm
cadence	Allscripts	Amdocs	ePlus
syndigm	Avid	ARI Network	Factset
ec development	Cerner	Bridgeline	Hawksystems
e plus	Digi int	Catamaran	HES
factset	Electronic arts	Cerner	iBrands
fair issac	Epazz	CSG	Micros
hawk systems	Healthnostics	Daegis	netscout
he-5	Incentra	Dealertrack	numobile
information architects	Innerworkings	Decision Diagnostic	seachange
mentor graphics	Jack Hentry and associat	eDoorways	telecommunication
micros systems	Med assets	FAB	
etscout systems	Merge healthcare	Flint telecom	
netsol tech	Pipeline	Ice web	
numobile	PTS	ICG group	
realpage	Quality systems	Infinix	
rovi	Smart Pros	Incentra	
telecommunication syst	Take-Two interactive	Interact holdings	
tibco		Inuvo	
		Liveperson	
		Medassets	
		medlink	
		merge healthcare	
		MSGI	
		paper free medical	
		PC_Tel	
		Premier	
		Quality systems	
		SARS	
		Unwired Planet	
		Workstream inc	

Table 1 Differences in data standards

Coding Scheme

Code	Decsription	Information	Features
Control	Nr target markets	Count	The customer sectors are identified and counted
Control	Nr related acquisitions	Count	The number of acquisitions in the year. Names used to cross check.
Control	Nr products	Count	The product names are identified in the report and counted
Control	Nr employees	Number	the total number of employees given in the annual report
Control	R&D Value	Dollar value in thousands	Most reports have the figures in thousands - if not then convert.
X1	Compatability acq	No (0); Yes (1)	(1)= the acquisition is explicitly identified as compatable in the annual report and press. (0)= it is not identified. Operational definition to **Software Compatibility** is where the acquisition is based on the same standards for example Bottomline 2005 purchase of Visibility; "By combining the powerful transactional capabilities of Bottomline's Legal eXchange with Visibillity's extensive planning and collaboration tools, Bottomline will further enhance its feature-rich platform to proactively manage and control legal-related fees, expenses and relationships: finextra (2006).
x2	Complementarity acq	No (0); Yes (1)	(1)= the acquisition is explicitly identified as complemntary in the annual report and press. (0)= it is not identified. Operational definition to **Software Complementarity** is where the joint use adds more value to the customer than the use of separate products. For example, CA 2012 purchase of Paragon "The acquisition brings PGTI products iXp and iDash into the CA Technologies fold adding critical-path monitoring, predictive analytics, SLA management, historical reporting and administration to its workload automation product portfolio" CA

			(2012).
x3	Competency acq	No (0); Yes (1)	(1)= the acquirer explicitly identifies the acquisition of competencies in the annual report press. (0)= it is not identified. **Operational definition to the Acquisition of Competencies** is the acquisition of technical know-how or specific technologies for example: Adobe 2006 report "The key technology and expertise we gain from TTF will help enable Adobe to provide manufacturing organizations even more comprehensive solutions for 3D visualization and collaboration that extend across and beyond the enterprise." Business Wire (2006)
x4	Related divestment of people	Nr divestments (0) Divestments (1)	Only include divestments attributed to the acquisition - allocate zero if due to organisation change, cost reduction or other reasons.
x5	Nr related divestments	Count	The product divestments are identified in the report and counted.
x6	Appropriability Regime	Weak (0); Strong (1)	Weak (0) = business secrecy, lead time advantage and complexity of product designs, customer licence, software security tight (1) = patent and copyright
x7	Nr Org restructure	Count	Barkema and Schijven (2008) found that acquisitive growth decreases an acquirers performance. This variable is operationalised as a count of references in the annual reports to organisation restructures are counted. For example On October 5, 2005, the Company issued a press release announcing a restructuring of its organization, combining its three business units into one operating unit under the ACI Worldwide name.
x8	Nr country devel	Count	The number of countries listed for software development. If the word Global is used allocate the number 10

x9	Nr country sales	Count	The number of countries listed for software sales. If the word Global is used allocate the number 10
x10	Nr business model changes	Count	A count of changes to: revenue capture methods; Sales channels, embedded product features, target markets and customer types
Outcome	Revenue	Dollar value in thousands	Most reports have the figures in thousands - if not then convert.
Outcome	Licence Revenue	Dollar value in thousands	Most reports have the figures in thousands - if not then convert.
Outcome & Moderator	Nr new products	Count	The number of new products launched as referenced in the annual report
Outcome & Moderator	Nr changed products	Count	The documented changes to the product line.
Outcome & Moderator	Nr Product integrations	Count	The combination of product change and new product.

Operationalisation of variables – extract from Coding Scheme

As divestment of assets post acquisition may impact the product integration, I will collect data on divestments of products. I will also collect data on any divestment of people that is directly related to the acquisition, for example, Fair Isaac (2004): "During fiscal 2004, in connection with our acquisition of London Bridge, we completed a plan to exit certain London Bridge office space and reduce London Bridge staff".

I will collect data on the complementarity of the portfolio, for example, the CA Technologies 2012 purchase of Paragon "The acquisition brings PGTI products iXp and iDash into the CA Technologies fold adding critical-path monitoring, predictive analytics, SLA management, historical reporting and administration to its workload automation product portfolio" (CA, 2012).

I will collect data on whether competencies were acquired, for example, Adobe (2006) report, "We anticipate the acquisition of TTF will help us significantly accelerate and expand that effort. The key technology and expertise we gain from TTF will help enable Adobe to provide manufacturing organisations even more comprehensive solutions for 3D visualisation and collaboration that extend across and beyond the enterprise."

I will collect data for software compatibility, for example, as reported by Finextra (2005) regarding the Bottomline 2005 purchase of Visibility; "By combining the powerful transactional capabilities of Bottomline's Legal eXchange with Visibillity's extensive planning and collaboration tools, Bottomline will further enhance its feature-rich platform to proactively manage and control legal-related fees, expenses and relationship".

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Results: Fixed effect regression analysis including the Year dummy variables

Dependent variable: Revenue

Dependent Variable: Revenue	MODEL 1		MODEL 2		MODEL 3		MODEL 4		MODEL 5		MODEL 6		MODEL 7		MODEL 8		MODEL 9		MODEL 10		MODEL 11		MODEL 12 (T+1)	
Variable	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.
Intercept	83,174	0.95	118,999	0.93	122,492	0.93	93,640	0.94	183,898	0.89	167,904	0.90	310,577	0.81	-56,431	0.97	-185,494	0.89	-503,952	0.71	-538,329	0.69	-832,193	0.57
Nr_target_markets	15,888	0.67	17,187	0.64	17,931	0.63	18,395	0.62	18,359	0.62	20,819	0.57	35,840	0.34	26,845	0.48	20,740	0.59	19,466	0.61	20,093	0.60	10,303	0.81
Nr_related_acquisitions	53,138	0.28	-27,109	0.63	-30,950	0.60	-35,809	0.56	-25,818	0.67	-26,099	0.67	-29,798	0.63	-34,814	0.57	-37,920	0.54	-38,362	0.53	-43,547	0.47	-115	1.00
Nr_products	-20,821	0.00	-20,109	0.01	-20,256	0.00	-20,390	0.00	-20,399	0.00	-20,078	0.01	-18,728	0.01	-19,995	0.01	-20,245	0.01	-21,838	0.00	-21,188	0.00	-23,280	0.00
Nr_employees	278	0.00	278	0.00	278	0.00	278	0.00	277	0.00	277	0.00	278	0.00	280	0.00	281	0.00	282	0.00	281	0.00	314	0.00
R&D_Value	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00
YR03_2003	-454,138	0.74	-576,010	0.67	-599,464	0.65	-568,766	0.67	-588,285	0.66	-501,021	0.71	-511,762	0.70	-422,537	0.75	-258,570	0.85	-381,119	0.78	-388,839	0.77	-182,462	0.90
YR04_2004	-610,133	0.65	-670,403	0.61	-693,251	0.60	-674,691	0.61	-692,354	0.60	-631,038	0.64	-640,626	0.63	-541,990	0.68	-560,844	0.67	-718,579	0.59	-706,090	0.59	-759,551	0.60
YR05_2005	-465,790	0.73	-564,482	0.67	-594,473	0.66	-578,595	0.67	-615,349	0.65	-547,438	0.68	-572,052	0.67	-460,688	0.73	-442,713	0.74	-571,554	0.67	-546,269	0.68	-214,909	0.88
YR06_2006	-289,764	0.83	-309,012	0.82	-336,749	0.80	-324,436	0.81	-345,137	0.80	-291,601	0.83	-305,021	0.82	-197,328	0.88	-145,039	0.91	-284,520	0.83	-255,306	0.85	-60,714	0.97
YR07_2007	-235,250	0.86	-297,588	0.82	-321,228	0.81	-302,367	0.82	-332,849	0.80	-252,677	0.85	-266,392	0.84	-150,997	0.91	-89,921	0.95	-225,064	0.87	-178,959	0.89	48,269	0.97
YR08_2008	-69,122	0.96	-90,128	0.95	-120,967	0.93	-102,690	0.94	-131,218	0.92	-54,942	0.97	-56,933	0.97	64,398	0.96	126,544	0.92	-8,495	1.00	-5,366	1.00	-166,385	0.91
YR09_2009	-140,190	0.92	-177,402	0.89	-201,331	0.88	-193,524	0.88	-225,941	0.87	-127,903	0.92	-148,863	0.91	-29,340	0.98	288	1.00	-133,173	0.92	-132,368	0.92	-273,425	0.85
YR10_2010	-137,152	0.92	-217,272	0.87	-248,540	0.85	-231,329	0.86	-230,101	0.86	-160,990	0.90	-145,732	0.91	-31,748	0.98	11,958	0.99	-133,500	0.92	-122,244	0.93	128,294	0.93
YR11_2011	70,307	0.96	-8,861	1.00	-37,539	0.98	-23,470	0.99	-52,061	0.97	-3,051	1.00	11,274	0.99	123,179	0.93	182,853	0.89	44,452	0.97	43,843	0.97	-20,327	0.99
YR12_2012	24,552	0.99	-133,071	0.92	-162,940	0.90	-146,827	0.91	-147,677	0.91	-71,575	0.96	-54,359	0.97	56,748	0.97	94,189	0.94	-57,927	0.97	-64,705	0.96	-134,050	0.93
Nr_related_divest			499,214	0.00	499,536	0.00	505,889	0.00	522,227	0.00	525,338	0.00	531,825	0.00	541,133	0.00	545,940	0.00	536,182	0.00	567,723	0.00	870,863	0.00
Compatability_acq					49,772	0.83	-16,768	0.96	189,235	0.62	201,778	0.59	150,457	0.69	88,492	0.82	81,967	0.83	70,368	0.85	72,251	0.85	41,856	0.92
Complementarity_acq							100,249	0.76	283,251	0.46	309,841	0.42	428,320	0.26	372,908	0.33	366,688	0.34	355,127	0.35	383,890	0.31	577,829	0.17
Competency_acq									-465,768	0.32	-486,341	0.30	-508,836	0.27	-415,684	0.38	-425,601	0.36	-416,443	0.37	-426,109	0.36	-715,367	0.16
Nr_Org_restructure											-214,426	0.31	-83,904	0.70	-105,094	0.63	-88,089	0.69	-108,808	0.62	-83,742	0.70	-160,442	0.50
Nr_country_devel													-56,009	0.02	-67,186	0.01	-66,453	0.01	-75,368	0.01	-74,005	0.01	-86,701	0.00
Nr_country_sales															45,425	0.19	43,432	0.21	31,679	0.37	32,420	0.36	39,437	0.31
Nr_business_model_changes																	86,587	0.38	106,792	0.28	103,875	0.29	201,845	0.06
Appropriability_Regime																			704,606	0.03	719,403	0.03	903,228	0.01
Related divest people																					-532,958	0.23	-767,525	0.12
x2 change			8.95		0.05		0.09		1.00		1.05		5.07		1.70		0.78		4.49		-93.07		2.47	
2LL	15432.55		15423.60		15423.55		15423.46		15422.46		15421.42		15416.35		15414.65		15413.87		15409.38		15502.44		15499.98	
WALD Z	15.51		15.51		15.51		15.51		15.51		15.51		15.51		15.51		15.51		15.51		15.51		15.51	
MODEL F (INTERCEPT)	0.00	0.95	0.01	0.93	0.01	0.93	0.01	0.94	0.02	0.89	0.02	0.90	0.06	0.81	0.00	0.97	0.02	0.89	0.14	0.71	0.29	0.59	0.32	0.57

Table 2 Results of Fixed Effect Regression model for dependent variable: Revenue

Dependent variable: Product integration

Dependent Variable:Product Integration	MODEL 21		MODEL 22		MODEL 23		MODEL 24		MODEL 25		MODEL 26		MODEL 27		MODEL 28		MODEL 29		MODEL 30		MODEL 32		MODEL 33 (T+1)	
Variable	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.	Estimate	Sig.
Intercept	5.79	0.00	5.77	0.00	5.79	0.00	5.67	0.00	5.67	0.00	5.66	0.00	5.68	0.00	4.74	0.00	3.32	0.01	3.60	0.00	3.58	0.00	0.92	0.52
Nr_target_markets	0.09	0.03	0.09	0.03	0.09	0.02	0.09	0.02	0.09	0.02	0.09	0.02	0.10	0.01	0.07	0.06	0.01	0.87	0.01	0.85	0.01	0.84	0.04	0.35
Nr_related_acquisitions	0.07	0.16	0.11	0.06	0.08	0.17	0.06	0.32	0.06	0.33	0.06	0.34	0.06	0.34	0.05	0.45	0.01	0.81	0.01	0.80	0.01	0.84	-0.01	0.89
Nr_products	0.05	0.00	0.05	0.00	0.05	0.00	0.04	0.00	0.04	0.00	0.05	0.00	0.05	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.04	0.00
Nr_employees	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.06	0.00	0.27	0.00	0.22	0.00	0.21	0.00	0.31
R&D_Value	0.00	0.12	0.00	0.10	0.00	0.08	0.00	0.09	0.00	0.09	0.00	0.10	0.00	0.10	0.00	0.11	0.00	0.09	0.00	0.08	0.00	0.09	0.00	0.64
YR03_2003	-5.10	0.00	-5.04	0.00	-5.20	0.00	-5.07	0.00	-5.07	0.00	-5.02	0.00	-5.02	0.00	-4.79	0.00	-2.98	0.02	-2.87	0.02	-2.87	0.02	1.17	0.41
YR04_2004	-3.52	0.01	-3.49	0.01	-3.65	0.01	-3.57	0.01	-3.57	0.01	-3.53	0.01	-3.54	0.01	-3.28	0.02	-3.49	0.01	-3.35	0.01	-3.34	0.01	0.31	0.82
YR05_2005	-4.11	0.00	-4.07	0.00	-4.27	0.00	-4.20	0.00	-4.20	0.00	-4.16	0.00	-4.16	0.00	-3.88	0.01	-3.68	0.00	-3.56	0.01	-3.55	0.00	0.18	0.90
YR06_2006	-4.09	0.00	-4.08	0.00	-4.27	0.00	-4.22	0.00	-4.22	0.00	-4.18	0.00	-4.19	0.00	-3.91	0.01	-3.33	0.01	-3.21	0.01	-3.19	0.01	0.67	0.63
YR07_2007	-3.95	0.01	-3.92	0.01	-4.08	0.00	-4.00	0.00	-4.00	0.00	-3.95	0.01	-3.95	0.01	-3.65	0.01	-2.98	0.02	-2.86	0.02	-2.83	0.02	0.07	0.96
YR08_2008	-4.28	0.00	-4.27	0.00	-4.48	0.00	-4.41	0.00	-4.40	0.00	-4.35	0.00	-4.36	0.00	-4.04	0.00	-3.36	0.01	-3.24	0.01	-3.24	0.01	0.57	0.68
YR09_2009	-4.00	0.00	-3.99	0.00	-4.15	0.00	-4.12	0.00	-4.11	0.00	-4.05	0.00	-4.06	0.00	-3.75	0.01	-3.42	0.01	-3.30	0.01	-3.30	0.01	0.08	0.95
YR10_2010	-4.27	0.00	-4.23	0.00	-4.45	0.00	-4.38	0.00	-4.38	0.00	-4.33	0.00	-4.33	0.00	-4.04	0.00	-3.55	0.01	-3.43	0.01	-3.42	0.01	-0.04	0.98
YR11_2011	-4.46	0.00	-4.43	0.00	-4.62	0.00	-4.57	0.00	-4.56	0.00	-4.53	0.00	-4.53	0.00	-4.24	0.00	-3.58	0.00	-3.46	0.01	-3.46	0.01	-0.56	0.69
YR12_2012	-4.88	0.00	-4.81	0.00	-5.01	0.00	-4.95	0.00	-4.95	0.00	-4.90	0.00	-4.90	0.00	-4.61	0.00	-4.20	0.00	-4.06	0.00	-4.07	0.00	-0.26	0.85
Nr_related_divest			-0.23	0.19	-0.23	0.19	-0.20	0.25	-0.20	0.25	-0.20	0.25	-0.20	0.26	-0.18	0.31	-0.12	0.44	-0.11	0.47	-0.10	0.54	-0.10	0.59
Compatability_acq					0.34	0.16	0.06	0.85	0.04	0.91	0.05	0.90	0.04	0.92	-0.12	0.77	-0.19	0.60	-0.18	0.62	-0.18	0.62	-0.17	0.67
Complementarity_acq							0.42	0.23	0.40	0.32	0.41	0.30	0.44	0.28	0.29	0.46	0.23	0.53	0.24	0.51	0.25	0.49	0.07	0.87
Competency_acq									0.05	0.92	0.03	0.94	0.03	0.95	0.27	0.58	0.16	0.72	0.15	0.73	0.15	0.74	0.82	0.10
Nr_Org_restructure											-0.14	0.54	-0.11	0.63	-0.17	0.46	0.02	0.91	0.04	0.84	0.05	0.79	-0.10	0.65
Nr_country_devel													-0.01	0.69	-0.04	0.16	-0.03	0.21	-0.02	0.36	-0.02	0.38	-0.01	0.72
Nr_country_sales															0.12	0.00	0.09	0.00	0.10	0.00	0.11	0.00	0.16	0.00
Nr_business_model_changes																	0.96	0.00	0.94	0.00	0.94	0.00	0.20	0.05
Appropriability_Regime																			-0.62	0.05	-0.62	0.05	-1.23	0.00
Related divest people																					-0.30	0.47	-1.31	0.01
x2 change			0.74		3.00		1.43		0.01		0.38		0.16		10.14		96.15		3.93		-118.61			
2LL	2181.9		2181.2		2178.2		2176.8		2176.7		2176.4		2176.2		2166.1		2069.9		2066		2184.6			
WALD Z	15.51																15.56							
MODEL F (INTERCEPT)	18.07	0.00	18.03	0.00	18.26	0.00	17.46	0.00	17.32	0.00	17.27	0.00	17.40	0.00	11.82	0.00	6.97	0.01	8.17	0.00	0.49	0.48	0.42	0.52

Table 3 Results of Fixed Effect Regression for dependent variable: Product integration

Robustness summary test results: including Revenues T+2 and accounting measures

		(Y) Revenue			(Y) Revenue T+1			(Y) Revenue T+2			(Y) Licence Revenue			(Y) Licence Revenue T+1			(Y) Licence Revenue T+2		
Antecedant		Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.
M	Product integration	-91,735	43,544	0.04	-76,525	48,800	0.12	-73290	54053	0.18	-174,635	90,062	0.05	-191,008	97,813	0.05	1984000	719755	0.01
M	Product integration T+1	-63,466	41,704	0.13	-84,530	46,595	0.07	-70702	51661	0.17	-220,140	85,817	0.01	-220,436	93,304	0.02	-235227	100836	0.02
M	Product integration T+2	-66229	42017	0.12	-58424	47039	0.22	-77482	52033	0.14	-250380	86316	0.00	-260590	93817	0.01	-274083	101416	0.01
M	Nr New Products	-118,705	71,352	0.10	-78,984	79,950	0.32	-8089	88589	0.93	-119,639	147,798	0.42	-125,290	160,535	0.44	-161168	173386	0.35
M	Nr New Products T+1	-40,929	70,428	0.56	-66,041	78,738	0.40	-33870	87218	0.70	-216,509	145,280	0.14	-174,018	157,957	0.27	-175044	170710	0.31
M	Nr Changed products	-84,283	58,220	0.15	-83,632	65,145	0.20	-117218	71023	0.10	-231,148	120,133	0.06	-256,520	130,458	0.05	-269058	138995	0.05
M	Nr Changed products T+1	-84,283	58,220	0.15	-83,632	65,145	0.20	-102760	68310	0.13	-231,148	120,133	0.06	-256,520	130,458	0.05	-320485	133342	0.02
X1	Compatability_acq	72,251	377,108	0.85	870,863	414,973	0.92	100777	456048	0.83	680,712	751,362	0.37	720,092	817,037	0.88	771278	881833	0.38
x2	Complementarity_acq	383,890	381,336	0.31	577,829	419,625	0.17	673458	461160	0.15	-379,096	759,785	0.62	51,784	826,197	0.06	-138362	891719	0.88
x3	Competency_acq	-426,109	465,135	0.36	-715,367	511,838	0.16	-793982	562501	0.16	-792,466	926,750	0.39	-1,027,010	1,007,756	-1.02	-798715	1087677	0.46
x4	Related divest people	-532,958	443,676	0.23	-767,525	488,225	0.12	-957417	536550	0.08	-1,260,835	883,994	0.15	-1,293,556	961,263	-1.35	-1215477	1037497	0.24
x5	Nr_related_divest	567,723	167,894	0.00	870,863	184,752	0.00	1081840	203039	0.00	776,026	334,518	0.02	709,733	363,758	1.95	657008	392606	0.10
x6	Appropriability_Regime	719,403	331,431	0.03	903,228	364,708	0.01	1054165	400808	0.01	1,592,377	660,352	0.02	1,795,225	718,073	2.50	2084534	775020	0.01
x7	Nr_Org_restructure	-83,742	216,958	0.70	-160,442	238,743	0.50	37190	262374	0.89	1,223.962	432,275	0.01	1,008,793	470,059	2.15	968198	507338	0.06
x8	Nr_country_devel	-74,005	26,400	0.01	-86,701	29,051	0.00	-107874	31926	0.00	-315,001	52,600	0.00	-352,407	57,197	-6.16	-392591	61734	0.00
x9	Nr_country_sales	32,420	35,040	0.36	39,437	38,558	0.31	45577	42375	0.28	277,139	69,814	0.00	308,282	75,917	4.06	341272	81937	0.00
x10	Nr_business_model_changes	103,875	97,984	0.29	201,845	107,822	0.06	222283	118494	0.06	-312,002	195,226	0.11	-418,977	212,290	-1.97	-453886	229126	0.05

		(Y) Revenue Log			(Y) ROA EBIT			(Y) EBIT			(Y) Debt to Equity ratio			(Y) ROE - shareholder equity		
Antecedant		Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.
M	Product integration	-0.02	0.01	0.15	-48.81	29.18	0.10	-61,962.47	32,920.68	0.06	-113.76	75.65	0.13	34.15	22.24	0.13
M	Product integration T+1	-0.02	0.01	0.07	-23.32	28.10	0.41	-19,600.45	31,728.22	0.54	-79.42	72.75	0.28	24.08	21.39	0.26
M	Nr New Products	-0.01	0.02	0.54	-59.75	48.23	0.22	-78,820.02	54,413.16	0.15	-164.13	124.92	0.19	50.47	36.72	0.17
M	Nr New Products T+1	-0.03	0.02	0.18	12.24	47.37	0.80	38,062.95	53,449.89	0.48	-89.58	122.66	0.47	34.07	36.05	0.35
M	Nr Changed products	-0.02	0.02	0.16	-47.45	38.84	0.22	-58,321.11	43,828.52	0.18	-94.49	100.68	0.35	27.58	29.60	0.35
M	Nr Changed products T+1	-0.02	0.02	0.12	-48.16	37.27	0.20	-56,254.10	42,074.45	0.18	-83.39	96.66	0.39	21.17	28.42	0.46
X1	Compatability_acq	0.05	0.10	0.63	276.74	243.23	0.26	418,132.28	287,970.38	0.15	450.14	656.50	0.49	-161.60	193.69	0.41
x2	Complementarity_acq	0.05	0.10	0.66	-684.03	247.29	0.01	-646,442.68	292,770.82	0.03	567.46	667.45	0.40	-196.98	196.92	0.32
x3	Competency_acq	-0.01	0.12	0.92	745.35	301.69	0.01	208,055.55	357,170.90	0.56	-1,233.90	814.26	0.13	406.94	240.24	0.09
x4	Related divest people	-0.04	0.12	0.72	-86.09	287.87	0.77	-141,107.11	340,817.79	0.68	-215.40	776.98	0.78	58.25	229.24	0.80
x5	Nr_related_divest	0.02	0.05	0.74	-27.12	108.81	0.80	177,064.24	128,823.64	0.17	119.10	293.69	0.69	-38.15	86.65	0.66
x6	Appropriability_Regime	0.29	0.09	0.00	635.77	214.79	0.00	668,064.52	254,287.99	0.01	1,088.24	579.72	0.06	-295.72	171.04	0.08
x7	Nr_Org_restructure	0.19	0.06	0.00	48.01	140.39	0.73	-201,495.38	166,211.27	0.23	-159.75	378.92	0.67	48.21	111.80	0.67
x8	Nr_country_devel	-0.03	0.01	0.00	-23.08	17.13	0.18	-20,791.87	20,276.90	0.31	-12.07	46.23	0.79	6.16	13.64	0.65
x9	Nr_country_sales	0.02	0.01	0.09	-132.30	22.67	0.00	3,506.57	26,845.03	0.90	-240.58	61.20	0.00	61.14	18.06	0.00
x10	Nr_business_model_changes	-0.04	0.03	0.14	7.26	63.50	0.91	-28,487.79	75,182.61	0.71	-283.30	171.40	0.10	89.25	50.57	0.08

Robustness summary test results: including Product integration(s) T+2

	M (Product Integration)			M (Product Integration T+1)			M (Product Integration T+2)			M (New Product)			M (New Product T+1)			M (Changed Product)			M (Changed Product T+1)		
Antecedant	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.	Estimate	SE	Sig.
X1 Compatability_acq	-0.18	0.36	0.62	-0.17	0.40	0.67	-0.13	0.40	0.75	-0.50	0.24	0.04	-0.14	0.24	0.57	0.32	0.27	0.24	0.32	0.27	0.24
x2 Complementarity_acq	0.25	0.36	0.49	0.07	0.41	0.87	-0.20	0.41	0.63	-0.07	0.24	0.77	0.03	0.25	0.92	0.32	0.27	0.24	0.32	0.27	0.24
x3 Competency_acq	0.15	0.44	0.74	0.82	0.49	0.10	0.61	0.49	0.22	0.55	0.29	0.06	0.33	0.30	0.27	-0.40	0.33	0.22	-0.40	0.33	0.22
x4 Related divest people	-0.30	0.42	0.47	-1.31	0.47	0.01	-0.52	0.47	0.27	-0.48	0.28	0.09	-0.62	0.29	0.03	0.17	0.32	0.58	0.17	0.32	0.58
x5 Nr_related_divest	-0.10	0.16	0.54	-0.10	0.18	0.50	-0.20	0.18	0.27	-0.08	0.11	0.45	0.03	0.11	0.77	-0.02	0.12	0.89	-0.02	0.12	0.89
x6 Appropriability_Regime	-0.62	0.31	0.05	-1.23	0.35	0.00	-1.32	0.35	0.00	-0.01	0.21	0.96	-0.16	0.21	0.45	-0.60	0.24	0.01	-0.60	0.24	0.01
x7 Nr_Org_restructure	0.05	0.21	0.79	-0.10	0.23	0.65	-0.16	0.23	0.49	-0.10	0.14	0.46	-0.27	0.14	0.05	0.16	0.15	0.31	0.16	0.15	0.31
x8 Nr_country_devel	-0.02	0.03	0.38	-0.01	0.03	0.72	-0.03	0.03	0.22	-0.03	0.02	0.12	-0.02	0.02	0.26	0.00	0.02	0.83	0.00	0.02	0.83
x9 Nr_country_sales	0.11	0.03	0.00	0.16	0.04	0.00	0.15	0.04	0.00	0.07	0.02	0.00	0.08	0.02	0.00	0.03	0.02	0.16	0.03	0.02	0.16
x10 Nr_business_model_changes	0.94	0.09	0.00	0.20	0.10	0.05	0.25	0.10	0.02	0.23	0.06	0.00	-0.02	0.06	0.70	0.71	0.07	0.00	0.71	0.07	0.00

Robustness Summary mediation test results: including T+2

Mediation Tests	Product Integration			Product Integration T+1			Product Integration +2			NEW Prod T+ Changed Prod			Changed Prod T+1	
	Revenue	Licence Sales	Licence Sales+1	Revenue +1	Licence sales	Licence Sales+1	Licence sales	Licence Sales+1	Licence Sales+2	Licence sales	Licence Sales	Licence Sales+1	Licence sales	Licence Sales+1
X1 Compatability_acq	0.62	0.62	0.62	0.67	0.67	0.67	0.75	0.75	0.75	0.59	0.31	0.31	0.31	0.31
x2 Complementarity_acq	0.51	0.51	0.51	0.85	0.85	0.85	0.63	0.63	0.63	0.92	0.31	0.31	0.31	0.31
x3 Competency_acq	0.70	0.70	0.70	0.22	0.17	0.18	0.25	0.26	0.26	0.35	0.30	0.30	0.30	0.30
x4 Related divest people	0.63	0.63	0.63	0.12	0.05	0.06	0.30	0.30	0.30	0.17	0.59	0.59	0.59	0.59
x5 Nr_related_divest	0.58	0.58	0.58	0.62	0.61	0.61	0.30	0.30	0.30	0.77	0.89	0.89	0.89	0.89
x6 Appropriability_Regime	0.15	0.17	0.17	0.10	0.04	0.05	0.02	0.03	0.03	0.49	0.12	0.12	0.12	0.12
x7 Nr_Org_restructure	0.88	0.88	0.88	0.80	0.80	0.80	0.50	0.50	0.50	0.19	0.37	0.37	0.37	0.37
x8 Nr_country_devel	0.41	0.41	0.41	0.73	0.73	0.73	0.26	0.26	0.26	0.34	0.83	0.83	0.83	0.83
x9 Nr_country_sales	0.08	0.10	0.10	0.09	0.03	0.04	0.02	0.02	0.02	0.10	0.26	0.25	0.26	0.25
x10 Nr_business_model_changes	0.04	0.06	0.06	0.18	0.12	0.13	0.06	0.07	0.07	0.71	0.06	0.05	0.06	0.05

Robustness mediation test results

Product integration

Sobel Test	IS9 Product Integration						Sobel Test	Product Integration +1					Sobel Test	Product Integration +2					
	Revenue	Revenue +1	Licence Rev	Licence Rev+1	ROA	EBIT		Revenue	Revenue +1	Licence Rev	Licence Rev+1	Revenue Log		Revenue	Revenue +1	Revenue +2	Licence Rev	Licence Rev+1	Licence Rev+2
KM7_Compatability_acq	0.62	0.62	0.62	0.62	0.63	0.63	KM7_Compatability_acq	0.67	0.67	0.67	0.67	0.63	KM7_Compatability_acq	0.75	0.75	0.75	0.75	0.75	0.75
KM6_Complementarity_acq	0.51	0.53	0.51	0.51	0.52	0.51	KM6_Complementarity_acq	0.85	0.85	0.85	0.85	0.51	KM6_Complementarity_acq	0.64	0.65	0.65	0.63	0.63	0.63
KM4_Competency_acq	0.70	0.71	0.70	0.70	0.75	0.74	KM4_Competency_acq	0.26	0.22	0.17	0.18	0.75	KM4_Competency_acq	0.33	0.38	0.34	0.25	0.26	0.26
KM201_related_divest_people	0.63	0.63	0.63	0.63	0.51	0.50	KM201_related_divest_people	0.18	0.12	0.05	0.06	0.50	KM201_related_divest_people	0.36	0.41	0.37	0.30	0.30	0.30
KM8_Nr_related_divest	0.58	0.59	0.58	0.58	0.57	0.56	KM8_Nr_related_divest	0.62	0.62	0.61	0.61	0.56	KM8_Nr_related_divest	0.36	0.41	0.37	0.30	0.30	0.30
AR2_Appropriability_Regime	0.15	0.22	0.17	0.17	0.20	0.17	AR2_Appropriability_Regime	0.16	0.11	0.04	0.05	0.18	AR2_Appropriability_Regime	0.15	0.24	0.17	0.02	0.03	0.03
IE5_Nr_Org_restructure	0.88	0.88	0.88	0.88	0.79	0.79	IE5_Nr_Org_restructure	0.80	0.80	0.80	0.80	0.79	IE5_Nr_Org_restructure	0.53	0.55	0.53	0.50	0.50	0.50
BM8_Nr_country_devel	0.41	0.43	0.41	0.41	0.43	0.42	BM8_Nr_country_devel	0.74	0.73	0.73	0.73	0.42	BM8_Nr_country_devel	0.33	0.38	0.34	0.26	0.26	0.26
BM10_Nr_country_Sales	0.08	0.16	0.10	0.10	0.14	0.11	BM10_Nr_country_Rev	0.15	0.10	0.03	0.04	0.11	BM10_Nr_country_Rev	0.14	0.23	0.16	0.02	0.02	0.02
BM1_Nr_business_model_changes	0.04	0.12	0.06	0.06	0.10	0.06	BM1_Nr_business_model_changes	0.23	0.18	0.12	0.13	0.07	BM1_Nr_business_model_changes	0.19	0.27	0.20	0.06	0.07	0.07

New product development

Sobel Test	IS1 NEW Products				Sobel Test	IS11 NEW Products +1			
	Revenue	Revenue +1	Licence Rev	Licence Rev+1		Revenue	Revenue +1	Licence Rev	Licence Rev+1
KM7_Compatability_acq	0.19	0.37	0.45	0.65	KM7_Compatability_acq	0.68	0.64	0.59	0.61
KM6_Complementarity_acq	0.78	0.78	0.79	0.92	KM6_Complementarity_acq	0.92	0.92	0.92	0.92
KM4_Competency_acq	0.24	0.38	0.46	0.52	KM4_Competency_acq	0.61	0.51	0.35	0.44
KM201_related_divest_people	0.28	0.39	0.46	0.46	KM201_related_divest_people	0.57	0.43	0.17	0.33
KM8_Nr_related_divest	0.77	0.55	0.58	0.78	KM8_Nr_related_divest	0.79	0.78	0.77	0.78
AR2_Appropriability_Regime	0.96	0.96	0.96	0.59	AR2_Appropriability_Regime	0.65	0.58	0.49	0.54
IE5_Nr_Org_restructure	0.51	0.55	0.59	0.47	IE5_Nr_Org_restructure	0.58	0.44	0.19	0.34
BM8_Nr_country_devel	0.27	0.40	0.47	0.52	BM8_Nr_country_devel	0.60	0.50	0.34	0.43
BM10_Nr_country_Sales	0.17	0.35	0.43	0.45	BM10_Nr_country_Rev	0.57	0.41	0.11	0.29
BM1_Nr_business_model_changes	0.16	0.34	0.43	0.73	BM1_Nr_business_model_changes	0.75	0.73	0.71	0.72

Product Changes

Sobel Test	IS7 Changed Products				Sobel Test	IS71 Changed Products +1			
	Revenue	Revenue +1	Licence Rev	Licence Rev+1		Revenue	Revenue +1	Licence Rev	Licence Rev+1
KM7_Compatability_acq	0.36	0.38	0.31	0.31	KM7_Compatability_acq	0.36	0.38	0.31	0.31
KM6_Complementarity_acq	0.36	0.38	0.31	0.31	KM6_Complementarity_acq	0.36	0.38	0.31	0.31
KM4_Competency_acq	0.35	0.38	0.30	0.30	KM4_Competency_acq	0.35	0.38	0.30	0.30
KM201_related_divest_people	0.60	0.61	0.59	0.59	KM201_related_divest_people	0.60	0.61	0.59	0.59
KM8_Nr_related_divest	0.89	0.89	0.89	0.89	KM8_Nr_related_divest	0.89	0.89	0.89	0.89
AR2_Appropriability_Regime	0.21	0.25	0.12	0.12	AR2_Appropriability_Regime	0.21	0.25	0.12	0.12
IE5_Nr_Org_restructure	0.41	0.43	0.37	0.37	IE5_Nr_Org_restructure	0.41	0.43	0.37	0.37
BM8_Nr_country_devel	0.83	0.83	0.83	0.83	BM8_Nr_country_devel	0.83	0.83	0.83	0.83
BM10_Nr_country_Sales	0.31	0.34	0.26	0.25	BM10_Nr_country_Rev	0.31	0.34	0.26	0.25
BM1_Nr_business_model_changes	0.15	0.20	0.06	0.05	BM1_Nr_business_model_changes	0.15	0.20	0.06	0.05

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Descriptive Data

Product integration Frequencies

PI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	62	12.8	12.8	12.8
	1	127	26.2	26.2	39.0
	2	79	16.3	16.3	55.4
	3	74	15.3	15.3	70.7
	4	59	12.2	12.2	82.9
	5	19	3.9	3.9	86.8
	6	25	5.2	5.2	91.9
	7	12	2.5	2.5	94.4
	8	10	2.1	2.1	96.5
	9	6	1.2	1.2	97.7
	10	2	.4	.4	98.1
	11	4	.8	.8	99.0
	12	2	.4	.4	99.4
	15	2	.4	.4	99.8
	16	1	.2	.2	100.0
	Total	484	100.0	100.0	

Figure 28 Product integration frequency table

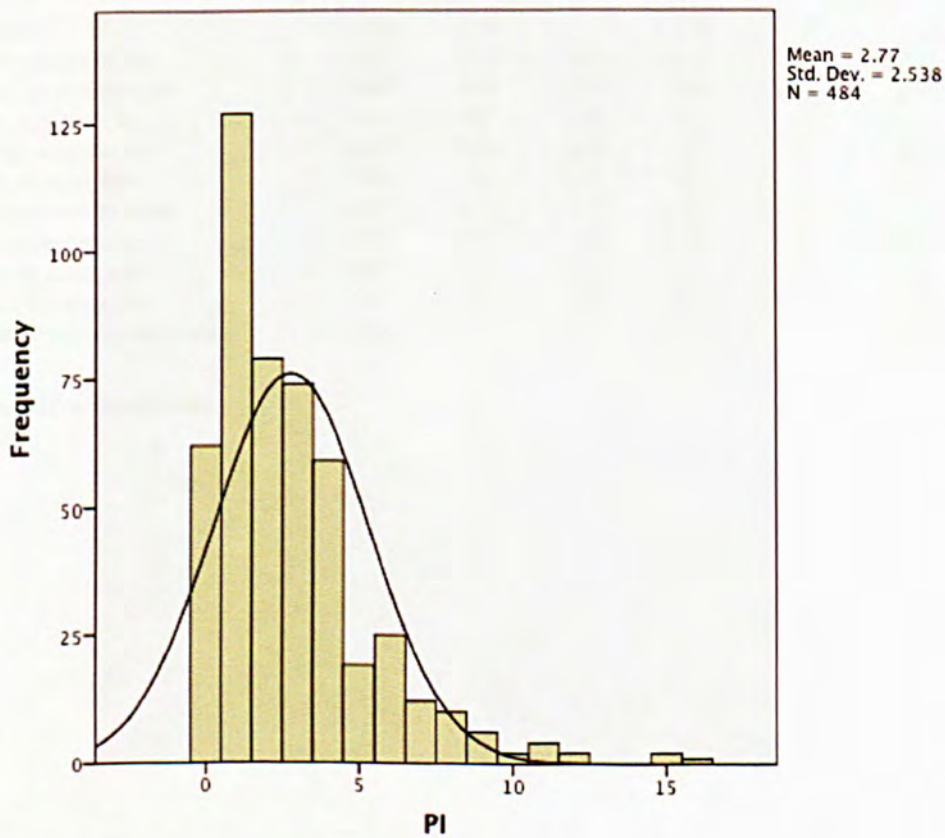

Figure 29 Product integration frequency histogram

Coefficient table

The multilevel regression analysis in SPSS does not show the Variance Inflation Factor (VIF), which is a useful tool to measure multicollinearity. However the standard linear regression option does measure the VIF within the coefficient table. Figure 30 shows that the VIF numbers are all less than 10 which means that there is a low level of concern. In addition the tolerance values are greater than 0.1, again demonstrating a low level of concern (Field, 2009).

Revenue

	Unstandardized Coefficients		Std Coefficient t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta		Tolerance	VIF
(Constant)	-757313.891	1355882.427		-0.559	0.577	
01KM7_Compatability_acq	-492301.121	1302376.612	-0.028	-0.378	0.706	0.302	3.315
02KM6_Complementarity_acq	4253379.178	1285974.396	0.243	3.308	0.001	0.308	3.249
03KM4_Competency_acq	-2519543.15	1594824.663	-0.136	-1.58	0.115	0.224	4.464
04KM201_redundancy_acq	-4074709.127	1528883.626	-0.111	-2.665	0.008	0.958	1.044
05KM8_Nr_related_divest	4589807.85	480587.788	0.409	9.55	0	0.904	1.106
06AR2_appropriability_regime	268641.63	1155433.103	0.01	0.233	0.816	0.88	1.136
07IE5_Nr_Org_restructure	-1058709.234	749312.454	-0.061	-1.413	0.158	0.888	1.126
08BM8_Nr_country_devel	233760.842	90612.917	0.122	2.58	0.01	0.74	1.352
09BM10_Nr_country_sales	72611.021	119731.84	0.028	0.606	0.545	0.762	1.312
010BM1_Nr_business_model_changes	-251823.191	304538.131	-0.034	-0.827	0.409	0.956	1.046

Product Integration

	Unstandardized Coefficients		Std Coefficient t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta		Tolerance	VIF
(Constant)	0.589	0.395		1.491	0.137	
01KM7_Compatability_acq	-0.317	0.379	-0.061	-0.836	0.403	0.302	3.315
02KM6_Complementarity_acq	0.494	0.374	0.096	1.319	0.188	0.308	3.249
03KM4_Competency_acq	0.152	0.464	0.028	0.327	0.744	0.224	4.464
04KM201_redundancy_acq	-0.194	0.445	-0.018	-0.436	0.663	0.958	1.044
05KM8_Nr_related_divest	0.029	0.14	0.009	0.211	0.833	0.904	1.106
06AR2_appropriability_regime	-0.499	0.336	-0.064	-1.483	0.139	0.88	1.136
07IE5_Nr_Org_restructure	-0.028	0.218	-0.006	-0.129	0.897	0.888	1.126
08BM8_Nr_country_devel	-0.012	0.026	-0.022	-0.474	0.636	0.74	1.352
09BM10_Nr_country_sales	0.14	0.035	0.184	4.004	0	0.762	1.312
010BM1_Nr_business_model_changes	0.899	0.089	0.417	10.139	0	0.956	1.046

Figure 30 Coefficient table

GICS company selection

PIVOT table of firms from GICS with the mergers and acquisition events.

	Firm Name	*ACQUISITION*	*BUY*	*DIV*	*JV*	*Spin*	*TOTAL*
1	ACI Worldwide Inc	8		2			10
2	Adobe Systems Inc	22		4			26
3	Advent Software Inc	7					7
4	ANSYS Inc	4		2			6
5	Autodesk Inc	31		16			47
6	Blackbaud Inc	10					10
7	BMC Software Inc	20		4			24
8	Bottomline Technologies de Inc	10		5			15
9	CA Inc	30		2			32
10	Cadence Design Systems Inc	16		1			17
11	Callidus Software Inc	9		2			11
12	Cinedigm Digital Cinema Corp	4		3			7
13	Citrix Systems Inc	28		2			30
14	Compuware Corp	8		2			10
15	Concur Technologies Inc	8			1		9
16	Ebix Inc	21		1			22
17	EPIQ Systems Inc	8					8
18	ePlus Inc	2		5			7
19	FactSet Research Systems Inc	9		1			10
20	Fair Isaac Corp	8		3			11
21	Informatica Corp	13		4			17
22	Interactive Intelligence Group Inc	6		2			8
23	Intuit Inc	13		2			15
24	Mentor Graphics Corp	14		4			18
25	MICROS Systems Inc	6		4			10
26	Microsoft Corp	70		23	2		95
27	Netscout Systems Inc	3		4			7
28	NetSol Technologies Inc	4			4		8
29	Nuance Communications Inc	33		7			40
30	NuMobile Inc	5		1			6
31	Oracle Corp	69		15			84
32	Progress Software Corp	11		2			13
33	PTC Inc	11		1			12
34	QAD Inc	5		3			8
35	Rand Worldwide Inc	4		2			6
36	Red Hat Inc	7		3			10
37	Rovi Corp	11		3			14
38	Salesforce.com Inc	18		1			19
39	Seachange International Inc	4		2			6
40	SilverSun Technologies Inc	6		3			9
41	Smith Micro Software Inc	3		5			8
42	Solera Holdings Inc	14		5			19
43	SS&C Technologies Holdings Inc	5		4			9

44	Symantec Corp	29	5	1	35
45	Synopsys Inc	26	7		33
46	TeleCommunication Systems Inc	6	3		9
47	TIBCO Software Inc	13			13
48	Tyler Technologies Inc	11	4		15
49	Verint Systems Inc	12	2		14
50	VMware Inc	19	5		24

Figure 31 GICS output in Pivot table

The following list of companies (Figure 32) have a comments section that explains why the full ten years of annual reports are not available. The company number relates to the GICS table in Figure 31, followed by the name and then the reason.

	Firm Name	***Comments***
12	Cinedigm Digital Cinema Corp	Reports available from 2004-2012
24	Mentor Graphics Corp	Changed reporting year end 2007
30	NuMobile Inc	Reports available from 2003 - 2010
38	Salesforce.com Inc	Reports available from 2005 – 2012, didn't start trading until 2005
42	Solera Holdings Inc	Reports available from 2007 – 2012, didn't start trading until 2007
43	SS&C Technologies Holdings Inc	One missing year - Didn't trade publicly in 2005
49	Verint Systems Inc	Years 2006 and 2007 combined
50	VMware Inc	Reports available from 2007 – 2012, didn't start trading until 2007

Figure 32 Company Data Collection notes

Figure 33 contains the list of companies that have been de-selected from the database.

	Firm Name (not used)	***Comments***
	AppTech	Moved into telecoms sector – no website.
	Broadsoft Inc	Not a public company before 2010
	EC Development Inc	Casino management, not software
	GBS Enterprises	Many missing reports – contacted the head office investor relations

		without success.
	iBrands Corp	Only 2003 available
	Information Architects group	Went into administration in 2006
	RealPage Inc	IPO in 2010 – New company
	WENR Corp	This is a holding company not a trading company.

Figure 33 Companies not used in data collection.

Regression Tables from SPSS

DV = REVENUE

Parameter	Estimate	Std. Error	df	t	Sig.	Lower Bound	Upper Bound

Estimates of Fixed Effects(a)

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Intercept	-538329.3742	1328223.11	481	-0.405	0.685	-3148165.81	2071507.057
BM6_Nr_target_mkts	20092.99096	38194.9447	481	0.526	0.599	-54956.5678	95142.54967
IE1_Nr_related_acq	-43547.04468	60833.968	481	-0.716	0.474	-163080.205	75986.11578
IS3_Nr_products	-21188.25272	7152.88919	481	-2.962	0.003	-35243.0231	-7133.48235
KM3_Nr_employees	281.434916	10.922689	481	25.766	0	259.972835	302.896997
PE25_RnD_Value	4.153887	0.131021	481	31.704	0	3.896443	4.41133
YR03_2003	-388838.5911	1334581.56	481	-0.291	0.771	-3011168.79	2233491.603
YR04_2004	-706090.1814	1316189.56	481	-0.536	0.592	-3292281.8	1880101.432
YR05_2005	-546268.5791	1319098.72	481	-0.414	0.679	-3138176.43	2045639.273
YR06_2006	-255305.625	1316956	481	-0.194	0.846	-2843003.23	2332391.979
YR07_2007	-178958.6162	1317699.46	481	-0.136	0.892	-2768117.05	2410199.815
YR08_2008	-5365.966701	1319127.64	481	-0.004	0.997	-2597330.63	2586598.695
YR09_2009	-132367.5718	1315907.72	481	-0.101	0.92	-2718005.39	2453270.251
YR10_2010	-122243.775	1318139.3	481	-0.093	0.926	-2712266.44	2467778.887
YR11_2011	43843.23765	1317889.05	481	0.033	0.973	-2545687.72	2633374.199
YR12_2012	-64705.24192	1319215.53	481	-0.049	0.961	-2656842.6	2527432.116
KM8_Nr_related_divest	567723.3899	167894.411	481	3.381	0.001	237826.292	897620.4879
KM7_Compatability_acq	72250.84358	377108.23	481	0.192	0.848	-668732.197	813233.884
KM6_Complementarity_acq	383889.6701	381335.918	481	1.007	0.315	-365400.389	1133179.729
KM4_Competency_acq	-426108.565	465135.312	481	-0.916	0.36	-1340056.74	487839.6075
IE5_Nr_Org_restructure	-83741.59183	216958.467	481	-0.386	0.7	-510045.055	342561.8717
BM8_Nr_country_devel	-74005.19255	26399.7867	481	-2.803	0.005	-125878.349	-22132.0362
BM10_Nr_country_sales	32419.87177	35039.8353	481	0.925	0.355	-36430.1868	101269.9303
BM1_Nr_business_model_changes	103874.8021	97983.6235	481	1.06	0.29	-88654.0197	296403.6239
AR2_Appropriability_Regime	719402.6575	331430.521	481	2.171	0.03	68172.12071	1370633.194
KM201_redundancy_acq	-532957.8092	443676.342	481	-1.201	0.23	-1404741.08	338825.4572

a. Dependent Variable: 00PE20_Revenue_Outcome.

Type III Tests of Fixed Effects(a)

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	481	0.164	0.685
BM6_Nr_target_mkts	1	481	0.277	0.599
IE1_Nr_related_acq	1	481	0.512	0.474
IS3_Nr_products	1	481	8.775	0.003
KM3_Nr_employees	1	481	663.891	0
PE25_RnD_Value	1	481	1005.147	0
YR03_2003	1	481	0.085	0.771
YR04_2004	1	481	0.288	0.592
YR05_2005	1	481	0.171	0.679
YR06_2006	1	481	0.038	0.846
YR07_2007	1	481	0.018	0.892
YR08_2008	1	481	0	0.997
YR09_2009	1	481	0.01	0.92
YR10_2010	1	481	0.009	0.926
YR11_2011	1	481	0.001	0.973
YR12_2012	1	481	0.002	0.961
KM8_Nr_related_divest	1	481	11.434	0.001
KM7_Compatability_acq	1	481	0.037	0.848
KM6_Complementarity_acq	1	481	1.013	0.315
KM4_Competency_acq	1	481	0.839	0.36
IE5_Nr_Org_restructure	1	481	0.149	0.7
BM8_Nr_country_devel	1	481	7.858	0.005
BM10_Nr_country_sales	1	481	0.856	0.355
BM1_Nr_business_model_changes	1	481	1.124	0.29
AR2_Appropriability_Regime	1	481	4.711	0.03
KM201_redundancy_acq	1	481	1.443	0.23

a. Dependent Variable: 00PE20_Revenue_Outcome.

Figure 34 Linear mixed model: Revenue

DV = REVENUE +1

Estimates of Fixed Effects(a)

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Intercept	-832193	1461585.91	481	-0.569	0.569	-3704075.1	2039689.08
BM6_Nr_target_mkts	10302.8389	42029.9816	481	0.245	0.806	-72282.215	92887.893
IE1_Nr_related_acq	-114.81803	66942.1197	481	-0.002	0.999	-131649.94	131420.299
IS3_Nr_products	-23279.559	7871.0888	481	-2.958	0.003	-38745.525	-7813.5922
KM3_Nr_employees	314.327159	12.019403	481	26.152	0	290.710137	337.944182
PE25_RnD_Value	4.295985	0.144176	481	29.797	0	4.012692	4.579277
YR03_2003	-182462.15	1468582.78	481	-0.124	0.901	-3068092.5	2703168.15
YR04_2004	-759550.99	1448344.11	481	-0.524	0.6	-3605414.1	2086312.17
YR05_2005	-214908.88	1451545.37	481	-0.148	0.882	-3067062.2	2637244.47
YR06_2006	-60713.708	1449187.51	481	-0.042	0.967	-2908234.1	2786806.65
YR07_2007	48269.1352	1450005.61	481	0.033	0.973	-2800858.7	2897397
YR08_2008	-166384.78	1451577.18	481	-0.115	0.909	-3018600.6	2685831.08
YR09_2009	-273424.66	1448033.97	481	-0.189	0.85	-3118678.4	2571829.1
YR10_2010	128293.806	1450489.61	481	0.088	0.93	-2721785.1	2978372.68
YR11_2011	-20326.583	1450214.24	481	-0.014	0.989	-2869864.4	2829211.22
YR12_2012	-134049.64	1451673.9	481	-0.092	0.926	-2986455.5	2718356.26
KM8_Nr_related_dives	870863.094	184752.172	481	4.714	0	507842.044	1233884.15
KM7_Compatability_ac	41855.856	414972.508	481	0.101	0.92	-773527.01	857238.724
KM6_Complementarity	577829.415	419624.685	481	1.377	0.169	-246694.55	1402353.38
KM4_Competency_acq	-715367.13	511838.118	481	-1.398	0.163	-1721082	290347.763
IE5_Nr_Org_restructure	-160442.43	238742.6	481	-0.672	0.502	-629549.72	308664.85
BM8_Nr_country_deve	-86701.444	29050.5081	481	-2.985	0.003	-143783.02	-29619.863
BM10_Nr_country_sale	39436.5384	38558.0774	481	1.023	0.307	-36326.543	115199.62
BM1_Nr_business_moc	201845.355	107821.858	481	1.872	0.062	-10014.694	413705.404
AR2_Appropriability_Re	903228.127	364708.44	481	2.477	0.014	186609.535	1619846.72
KM201_redundancy_a	-767524.99	488224.519	481	-1.572	0.117	-1726841.3	191791.353

a. Dependent Variable: 00PE201_Revenue+1_Outcome.

Type III Tests of Fixed Effects(a)

Source	Numerator d	Denominato	F	Sig.
Intercept	1	481	0.324	0.569
BM6_Nr_target_mkts	1	481	0.06	0.806
IE1_Nr_related_acq	1	481	0	0.999
IS3_Nr_products	1	481	8.747	0.003
KM3_Nr_employees	1	481	683.909	0
PE25_RnD_Value	1	481	887.849	0
YR03_2003	1	481	0.015	0.901
YR04_2004	1	481	0.275	0.6
YR05_2005	1	481	0.022	0.882
YR06_2006	1	481	0.002	0.967
YR07_2007	1	481	0.001	0.973
YR08_2008	1	481	0.013	0.909
YR09_2009	1	481	0.036	0.85
YR10_2010	1	481	0.008	0.93
YR11_2011	1	481	0	0.989
YR12_2012	1	481	0.009	0.926
KM8_Nr_related_dives	1	481	22.219	0
KM7_Compatability_ac	1	481	0.01	0.92
KM6_Complementarity	1	481	1.896	0.169
KM4_Competency_acq	1	481	1.953	0.163
IE5_Nr_Org_restructure	1	481	0.452	0.502
BM8_Nr_country_deve	1	481	8.907	0.003
BM10_Nr_country_sale	1	481	1.046	0.307
BM1_Nr_business_moc	1	481	3.504	0.062
AR2_Appropriability_Re	1	481	6.133	0.014
KM201_redundancy_a	1	481	2.471	0.117

a. Dependent Variable: 00PE201_Revenue+1_Outcome.

Figure 35 Linear mixed model: Revenue T+1

DV = Product Innovation

Parameter	Estimate	Std. Error	df	t	Sig.	Lower Bound	Upper Bound

Estimates of Fixed Effects(a)

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bounc	Upper Bounc
Intercept	3.577868	1.258411	481	2.843	0.005	1.105206	6.05053
BM6_Nr_target_mkts	0.007393	0.036187	481	0.204	0.838	-0.063712	0.078498
IE1_Nr_related_acq	0.011629	0.057637	481	0.202	0.84	-0.101621	0.124879
IS3_Nr_products	0.04105	0.006777	481	6.057	0	0.027734	0.054366
KM3_Nr_employees	-1.30E-05	1.03E-05	481	-1.258	0.209	-3.33E-05	7.32E-06
PE25_RnD_Value	2.12E-07	1.24E-07	481	1.708	0.088	-3.19E-08	4.56E-07
YR03_2003	-2.873862	1.264435	481	-2.273	0.023	-5.358361	-0.389363
YR04_2004	-3.344507	1.24701	481	-2.682	0.008	-5.794767	-0.894247
YR05_2005	-3.550663	1.249766	481	-2.841	0.005	-6.006338	-1.094987
YR06_2006	-3.192754	1.247736	481	-2.559	0.011	-5.64444	-0.741067
YR07_2007	-2.833119	1.24844	481	-2.269	0.024	-5.28619	-0.380048
YR08_2008	-3.236362	1.249794	481	-2.59	0.01	-5.692091	-0.780632
YR09_2009	-3.304516	1.246743	481	-2.651	0.008	-5.754251	-0.854781
YR10_2010	-3.418953	1.248857	481	-2.738	0.006	-5.872843	-0.965063
YR11_2011	-3.460538	1.24862	481	-2.771	0.006	-5.913962	-1.007115
YR12_2012	-4.066375	1.249877	481	-3.253	0.001	-6.522268	-1.610482
KM8_Nr_related_divest	-0.096468	0.15907	481	-0.606	0.545	-0.409025	0.21609
KM7_Compatability_acq	-0.178109	0.357287	481	-0.499	0.618	-0.880146	0.523927
KM6_Complementarity_ac	0.252472	0.361293	481	0.699	0.485	-0.457435	0.962379
KM4_Competency_acq	0.145555	0.440688	481	0.33	0.741	-0.720355	1.011466
IE5_Nr_Org_restructure	0.054976	0.205555	481	0.267	0.789	-0.348921	0.458873
BM8_Nr_country_devel	-0.022177	0.025012	481	-0.887	0.376	-0.071324	0.02697
BM10_Nr_country_sales	0.105068	0.033198	481	3.165	0.002	0.039836	0.170299
BM1_Nr_business_model_	0.937782	0.092834	481	10.102	0	0.755373	1.120192
AR2_Appropriability_Regin	-0.615303	0.31401	481	-1.96	0.051	-1.232305	0.001698
KM201_redundancy_acq	-0.301341	0.420356	481	-0.717	0.474	-1.127303	0.524621

a. Dependent Variable: 00IS9_Product Innovation_Mediator.

Type III Tests of Fixed Effects(a)

Source	Numerator d	Denominato	F	Sig.
Intercept	1	481	8.084	0.005
BM6_Nr_target_mkts	1	481	0.042	0.838
IE1_Nr_related_acq	1	481	0.041	0.84
IS3_Nr_products	1	481	36.691	0
KM3_Nr_employees	1	481	1.582	0.209
PE25_RnD_Value	0	.	.	.
YR03_2003	1	481	5.166	0.023
YR04_2004	1	481	7.193	0.008
YR05_2005	1	481	8.072	0.005
YR06_2006	1	481	6.548	0.011
YR07_2007	1	481	5.15	0.024
YR08_2008	1	481	6.706	0.01
YR09_2009	1	481	7.025	0.008
YR10_2010	1	481	7.495	0.006
YR11_2011	1	481	7.681	0.006
YR12_2012	1	481	10.585	0.001
KM8_Nr_related_divest	1	481	0.368	0.545
KM7_Compatability_acq	1	481	0.249	0.618
KM6_Complementarity_ac	1	481	0.488	0.485
KM4_Competency_acq	1	481	0.109	0.741
IE5_Nr_Org_restructure	1	481	0.072	0.789
BM8_Nr_country_devel	1	481	0.786	0.376
BM10_Nr_country_sales	1	481	10.016	0.002
BM1_Nr_business_model_	1	481	102.046	0
AR2_Appropriability_Regin	1	481	3.84	0.051
KM201_redundancy_acq	1	481	0.514	0.474

a. Dependent Variable: 00IS9_Product Innovation_Mediator.

Figure 36 Linear mixed model: Product Integration

DV = Product Innovation +1

Parameter	Estimate	Std. Error	df	t	Sig.	Lower Bound	Upper Bound

Estimates of Fixed Effects(a)

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval Lower Bounc	Upper Bounc
Intercept	0.915042	1.413101	481	0.648	0.52	-1.861571	3.691655
BM6_Nr_target_mkts	0.03789	0.040636	481	0.932	0.35	-0.041956	0.117735
IE1_Nr_related_acq	-0.008943	0.064721	481	-0.138	0.89	-0.136115	0.118229
IS3_Nr_products	0.044644	0.00761	481	5.866	0.00	0.029691	0.059597
KM3_Nr_employees	-1.18E-05	1.16E-05	481	-1.02	0.31	-3.47E-05	1.10E-05
PE25_RnD_Value	6.56E-08	1.39E-07	481	0.47	0.64	-2.08E-07	3.39E-07
YR03_2003	1.169501	1.419866	481	0.824	0.41	-1.620405	3.959406
YR04_2004	0.313202	1.400298	481	0.224	0.82	-2.438256	3.06466
YR05_2005	0.178087	1.403393	481	0.127	0.90	-2.579452	2.935626
YR06_2006	0.669576	1.401114	481	0.478	0.63	-2.083484	3.422636
YR07_2007	0.068986	1.401905	481	0.049	0.96	-2.685628	2.8236
YR08_2008	0.572607	1.403424	481	0.408	0.68	-2.184992	3.330207
YR09_2009	0.079578	1.399998	481	0.057	0.96	-2.67129	2.830447
YR10_2010	-0.040725	1.402373	481	-0.029	0.98	-2.796259	2.714808
YR11_2011	-0.560152	1.402106	481	-0.4	0.69	-3.315163	2.194858
YR12_2012	-0.261728	1.403518	481	-0.186	0.85	-3.019512	2.496055
KM8_Nr_related_divest	-0.095035	0.178623	481	-0.532	0.60	-0.446014	0.255943
KM7_Compatability_acq	-0.173083	0.401207	481	-0.431	0.67	-0.961417	0.615252
KM6_Complementarity_acq	0.065335	0.405705	481	0.161	0.87	-0.731837	0.862507
KM4_Competency_acq	0.824645	0.494859	481	1.666	0.10	-0.147707	1.796998
IE5_Nr_Org_restructure	-0.103761	0.230823	481	-0.45	0.65	-0.557307	0.349784
BM8_Nr_country_devel	-0.009964	0.028087	481	-0.355	0.72	-0.065152	0.045224
BM10_Nr_country_sales	0.157071	0.037279	481	4.213	0.00	0.083822	0.230321
BM1_Nr_business_model_cl	0.201992	0.104245	481	1.938	0.05	-0.00284	0.406824
AR2_Appropriability_Regime	-1.233154	0.35261	481	-3.497	0.00	-1.926	-0.540308
KM201_redundancy_acq	-1.303766	-0.472029	481	-2.766	0.01	-2.233201	-0.378215

a. Dependent Variable: 00IS91_Product Innovation+1_Mediator.

Type III Tests of Fixed Effects(a)

Source	Numerator d	Denominato	F	Sig.
Intercept	1	481	0.419	0.518
BM6_Nr_target_mkts	1	481	0.869	0.352
IE1_Nr_related_acq	1	481	0.019	0.89
IS3_Nr_products	1	481	34.416	0
KM3_Nr_employees	1	481	1.04	0.308
PE25_RnD_Value	0	.	.	.
YR03_2003	1	481	0.678	0.411
YR04_2004	1	481	0.05	0.823
YR05_2005	1	481	0.016	0.899
YR06_2006	1	481	0.228	0.633
YR07_2007	1	481	0.002	0.961
YR08_2008	1	481	0.166	0.683
YR09_2009	1	481	0.003	0.955
YR10_2010	1	481	0.001	0.977
YR11_2011	1	481	0.16	0.69
YR12_2012	1	481	0.035	0.852
KM8_Nr_related_divest	1	481	0.283	0.595
KM7_Compatability_acq	1	481	0.186	0.666
KM6_Complementarity_acq	1	481	0.026	0.872
KM4_Competency_acq	1	481	2.777	0.096
IE5_Nr_Org_restructure	1	481	0.202	0.653
BM8_Nr_country_devel	1	481	0.126	0.723
BM10_Nr_country_sales	1	481	17.753	0
BM1_Nr_business_model_cl	1	481	3.755	0.053
AR2_Appropriability_Regime	1	481	12.231	0.001
KM201_redundancy_acq	1	481	7.652	0.006

a. Dependent Variable: 00IS91_Product Innovation+1_Mediator.

Figure 37 Linear mixed model :product integration T+1