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The Impact of Functional Importance and Capability during Different Economic Conditions: Operations and Marketing Compared

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Abstract

This paper looks at how importance given to operations and marketing impacts their capability and firm performance. The paper also compares the effect of operations capability on firm performance to that of marketing capability. The relationships are studied under different economic conditions to understand the effect of the external environment. Results indicate that importance given to functions impacts their capabilities differently in economic downturns, and that marketing and operations capability are both important to firm performance with operations capability significantly more so.

1. Introduction

The prevalence of third party logistics companies, professional warehouse management firms, lean and six-sigma consulting practices, and outsourcing of manufacturing, have increased the perception that operations capability can be bought off-the-shelf, or in factor markets (Barney, 1986), and is hence not important for competitive advantage as it is not rare or inimitable (Barney, 1991). This perception is further deepened by studies in marketing literature that show a greater effect of marketing capability on firm performance than that of operations capability (Dutta et al., 1999; Krasnikov and Jayachandran, 2008; Nath et al., 2010). The operations task is often relegated to the 'technical' people who handle the material flow, with a view that such physical activities are not the basis of competitive advantage. Firms, especially those in the consumer products industry, rely heavily on their marketing and brand strength to survive competitive shocks and new competition. This leads us to question whether the operations capability can still be a source of competitive advantage and how does it compare with marketing capability.

The importance given to different functions can also have significant consequences for firm performance and competitive advantage. Due to time compression diseconomies, learning and path dependencies, and other reasons a firm may not be able to create capabilities 'just-in-time' or as needed (Dierickx and Cool, 1989). If the operations task is more than what can be out-sourced or purchased then firms that ignore operations could lose important capabilities, and suffer in the long run. This paper is aimed at investigating the impacts of importance given to marketing and importance given to operations on capabilities and firm performance. Economic downturns are used as natural experiments to see if those relationships differ in periods of economic growth and economic stagnation or recession. The results carry important implications to top management teams, shareholders and other stake holders.

Marketing and operations are two key functions that create value for the firm (Nath et al., 2010). A cursory study of annual reports for recent years of top performing firms sampled from Fortune 500 and Business Week's Top 50 revealed anecdotal evidence that operational or marketing focus was often highlighted by the top leadership in their letters to shareholders. Companies not concentrating on operations previously were found to shift focus to operational efficiencies during years of economic downturn. For example, Abercrombie & Fitch in 2008 was treating its brand as a strategic asset, and presenting its strategy as protecting and growing the brand (Abercrombie & Fitch, 2008). However it declared 2009 to be a transitional year and planned to reduce store openings and focus on cost structure and efficiencies (Abercrombie & Fitch, 2009). In contrast to Abercrombie & Fitch, McDonald's is a firm committed to operational excellence over the years, a fact it highlights in its annual reports consistently. McDonald's financial performance in 2008 was far above par, with a 17% growth in operating income when other firms were facing declines. It was one of just two companies on the Dow Jones to post a

gain in stock market return in 2008, a year when both Dow Jones and S&P fell significantly ("McDonald's 2008 Annual Report," 2008). Another company that is strongly driven by marketing and brand strength is L'Oreal, one of the leading multinational firms in cosmetics. In 2007 L'Oreal became the third largest advertiser in the world. A review of its annual reports suggests that L'Oreal is a company that is simultaneously pursuing operational and purchasing productivity year after year, as well as marketing and brand related goals. In 2010 L'Oreal annual reports mention that it was enjoying the fruits of continued focus and improvements in "industrial productivity and purchasing" as well as controlling marketing and administrative related costs. This simultaneous focus on productivity in marketing and operations, as well as a strong commitment to advertising and brand promotion has driven strong financial performance throughout 2008, 2009 and 2010 for the company. Its sales and profits have been growing with a very minor dip in 2009. Such anecdotal evidence leads us to inquire whether importance given to certain areas (functions) of the firm by top management has a significant impact on capability development of those areas and firm performance. The strength of this link between importance given to certain functions by top management and capabilities and performance has important implications practitioners and researchers.

Marketing and operations create value for the firm in different yet complementary ways. Marketing increases revenue for the firm, through price or quantity effects, by means such as building brands that are often strategic resources. The operations function produces the goods and services that customers pay for. In this paper for the sake of brevity we will refer to goods and services as the products of the firm. The work of both functions has a fundamental impact on the firm's economic value creation. We use the definition of economic value from the Resource Based Theory (RBT) (Peteraf and Barney, 2003) and the economics literature and define it as the

difference between what customers are willing to pay for products and the cost of producing them. Competitive advantage is the relative difference in economic value created by different firms (Peteraf and Barney, 2003). Marketing and operations both impact the two dimensions of value differently, i.e. customer willingness to pay and cost. Marketing adds to cost when it attempts to increase revenues and tries to make the revenues more sustainable. Operations directly impacts cost by choosing how and when to produce and also indirectly affects revenues through quality, delivery, after-sales service and so forth (Flynn et al., 1995; Barker and Emery, 2006). In this study we extend the literature that shows operations and marketing capabilities lead to firm performance, by studying the importance firms place on these functions and the consequences of these choices.

Research in operations management has looked at the performance impacts of different operations paradigms and technologies, such as JIT, lean manufacturing, and TQM, on firm performance (Hayes and Pisano, 1994; Flynn et al., 1995; Sakakibara et al., 1997; Cua et al., 2001; Hendricks and Singhal, 2001; King and Lenox, 2001; Shah and Ward, 2003; Barker and Emery, 2006; Ketokivi and Jokinen, 2006; Singh et al., 2009). However these are specific instances of operations related technologies, and the results of studies focusing on such individual technologies cannot easily be aggregated to form an understanding of operations capability. Researchers have not looked at the macro picture of measuring the importance of operations capability as it relates to the entire operations task of the firm, with rare exceptions (e.g. Vickery et al., 1993). This is essential if it is to be compared with marketing capability, whose importance has been established in the marketing literature (Jaworski and Kohli, 1993; Day, 1994; Dutta et al., 1999; Vorhies et al., 1999; Wind, 2005; Nath et al., 2010). Some marketing studies have included measures of operations capability along with marketing

capability but they have not tested whether one capability was greater than the other in influencing firm performance (e.g. Dutta et al., 1999; Nath et al., 2010). By studying operations capability as a single construct under different economic conditions, instead of specific instances of operations management technologies, we contribute constructively to the debate about the importance of marketing and operations capabilities (Krasnikov and Jayachandran, 2008). This allows a more general evaluation of operations capability, as specific technologies are relevant for specific circumstances, and allows comparison with existing studies in marketing that study functional capabilities.

We also investigate the link between importance or focus given to these functions by top management and the respective functional capabilities. Greater importance is linked to a greater ability to consume or use finite firm resources and hence should lead to greater capability. This has importance implications for managers because capabilities can be unlearned, and so focusing on one area only may lead to deterioration in others. Also the results may imply that managers can no longer concentrate just on order winners (Hill, 1993), as maintaining order qualifiers may require top management focus.

Our work tries to determine whether marketing and operations capabilities are asset stocks "accumulated by choosing appropriate time paths or flows over a period of time" (Dierickx and Cool, 1989, pg 1506) or if they are tradable factors that can be bought in factor markets. This is because if these capabilities can be acquired through factor markets they would not be a source of competitive advantage and would not explain performance differences between firms. Also importance would not lead to capability as firms could acquire these capabilities from markets with or without giving importance to those particular functions. On the other hand if these capabilities explain performance differences between firms and if importance

is consequential then it points towards the idea of capabilities being developed and nurtured rather than being bought. This is not obvious, because even though capabilities by their nature seem to be non-tradable, recent developments in marketing related services, logistics services and custom manufacturing mean that a lot of firms can buy (or rent) some capabilities off the shelf. For example business-to-business service firms offer quality logistics, warehousing, manufacturing, advertising, marketing research, and electronic customer support services to firms that do not want to do these tasks in-house. In addition to importance, the relationship between capabilities and firm performance also sheds light on this question. If important capabilities were available in factor markets, then those capabilities would no longer explain variance in firm performance as all firms would have access to them. Capabilities that explain greater variance in firm performance are more likely to be rare, inimitable, and valuable and hence non-tradable (Barney, 1991).

We then use economic recessions as a natural experiment to investigate the resilience of firms and its link with operations and marketing capability. Resilience is the ability to recover from adversity. Firms which perform well in periods of growth and recession are resilient firms. Since this paper evaluates relationships under both scenarios, it has normative implications for how firms can become more resilient, a question increasingly being asked in times of economic turbulence. We contribute to the literature on resilience as it is mostly concerned with natural disasters and not economic downturns. It often highlights the benefit of slack or excess capacity, in a firm's resources as a buffer against disruptions and disasters (Hamel and Valikangas, 2003) which may well work against firms in the case of economic contractions.

We investigate the links between importance given to these key functions, their capabilities, and the degree of resilience demonstrated by the firms. Perhaps the biggest contribution of our

work is that it takes the importance given to different functions at the corporate or business level, an attribute controlled by the firm and often overlooked by top management and researchers alike, and charts out its implications to capabilities and subsequently for firm performance & resilience. Our work has direct relevance and applicability for practitioners as well as researchers alike. Implications for research in sustainable competitive advantage, resilience, and the influence of top management teams are also explored.

2. Conceptual Framework

The resource based theory (Barney, 1991; Amit and Schoemaker, 1993; Peteraf, 1993; Peteraf and Barney, 2003) and top management team research (Hambrick and Mason, 1984; Hambrick, 2007) enable us to build a theoretical framework that gives insight in to the issues at hand and also allows empirically testable hypothesis to be developed.

2.1. Marketing and Operations Capabilities from the RBT Perspective

Operations capability and marketing capability can both be sources of sustained competitive advantage for firms. The resource based view argues that value created by resources (and capabilities) should be reflected in the rents earned by the firm as value is defined as the difference between the maximum price consumers are willing to pay and the cost of production (Peteraf, 1993; Peteraf and Barney, 2003). From the RBT perspective the value of the functional capabilities will be based on their marginal contribution to the firm's rents (such as through sales growth or cost reduction). The marginal contribution to the firm's rents can be determined by comparing the outputs that affect rents with the inputs or resources used in generating those outputs. Based on Peteraf and Barney (2003) we define functional capability in general as:

Functional capability is the ability of the function to achieve desired outcomes (e.g. sales growth) to the maximum possible extent by using inputs and resources (e.g. advertising budget) in the most efficient manner.

Functional capability is essentially efficiency of the function in contributing towards rents earned by the firm and/or value created by it while using up resources (or inputs). This view follows from the resource based theory, as "a critical feature of RBT is that it is an efficiency-based explanation of performance differences" (Peteraf and Barney, 2003, p. 311).

Most capabilities that relate to cost, quality, delivery, or superior process technology tend to lie in the operations department. Capabilities that give the firm advantages in terms of customer loyalty, brand strength, and so forth tend to lie both in the marketing and operations functions; customer loyalty may require product quality for example as well as customer service. Due to causal ambiguity (Reed and DeFillippi, 1990) a firm may not know exactly which capabilities are generating the competitive advantage but managers are likely to know generally which departments or functions are crucial for the firm's competitive position. For example in the case of Abercrombie and Fitch the top management was clear that brand was their strategic resource; since the brand was built not just on designs, and marketing but also on store experience both the marketing and operations functions were of key importance. Hence we argue that these two functions are fundamental for understanding firm performance and resilience and that is why we focus on these two functional capabilities in this paper.

2.1.1. Operations Capability

Operations capability has long been recognized to be an enabler of a firm's business strategy and competitive position, given alignment exists between the corporate and operations levels (Skinner, 1969, 1974, 2007; Hayes and Wheelwright, 1984). Hayes and Wheelright (1985)

concluded that most successful companies tended to focus more on building basic internal capabilities than on achieving specific market or financial goals. Operations researchers have shown that different operations technologies, such as quality practices, are of fundamental importance in explaining firm performance as well as in aiding business strategy (Swamidass and Newell, 1987; Vickery et al., 1993; Ward et al., 1994; Flynn et al., 1999; Shah and Ward, 2003; Ketokivi and Schroeder, 2004). Operations decisions are not only about achieving certain tasks and targets but also about developing new capabilities that could be useful in the future and herald new opportunities (Hayes and Wheelwright, 1984; Hayes and Pisano, 1994, 1996).

Operations capability is often defined in terms "the integration and coordination of a complex set of tasks" (Dutta et al., 1999, pg 551) that transform certain inputs such as materials and technologies to outputs. Research suggests that the ability to handle complexity within manufacturing and logistics systems is a core competence of firms which has a significant impact on their performance (Perona and Miragliotta, 2004). We recognize that in addition to coordination and managing complexity, the operations function is also involved in the development and improvement of manufacturing, supply management, and logistics processes. Practices such as 'lean' and 'six-sigma' serve to increase efficiency from a cost perspective and/or increase flexibility to react to sudden changes in environmental conditions and demand shifts. What is common between such improvement and capability development processes and processes that transform inputs to outputs is that they both affect the value created by the firm. Other researchers have focused exclusively on the quality improvement and product development aspect of operations, e.g. operations capability is "the result of strategic commitment to new product development, quality-improvement and waste-elimination strategies such as just-in-time (JIT)" (Tan et al., 2007, pg 5136). A definition of operational capability that

focuses on the value created by the operations function given the fundamental resources allocated to it by top management, such as capital (technology) and labor, captures both the management and coordination aspect and the development and improvement aspect of operations capability. This is because improvement programs also draw on capital and labor resources and lead to efficiency improvement over time. Such a definition would also conform closely to the resource based theory. We create a more holistic definition of operations capability that is based on our earlier definition of functional capabilities from the RBT perspective.

> *Operations capability is the ability to use inputs and resources (such as raw materials, labor, technology) efficiently in generating desired outputs (products and services).Operations capability aims to generate the maximum positive influence on the economic value generated by the firm through the cost efficiency, quality and timeliness of the conversion of inputs to outputs.*

This leads us to our first hypothesis:

Hypothesis 1a. *Operations capability positively affects firm performance*

2.1.2. Marketing Capability

In simplified terms "marketing is the creation of customer demand; operations management is the supply and fulfillment of that demand" (Ho and Tang, 2004). Marketing capability is aimed at increasing the value proposition for the customer as well as enabling the firm to create and capture greater economic value. Existing work shows that sustainable competitive advantage can be generated by 'market-driven' firms (Day, 1994; Vorhies and Harker, 2000) and firms that engage in 'market-based learning'(Vorhies and Morgan, 2005). Market-driven firms are those firms that focus on developing their marketing capability, for example by learning from superior firms (Jaworski and Kohli, 1993). Marketing capability is a

relatively well defined concept. Early research identified it as the skill in 'understanding and satisfying' customers (Day, 1994, pg 37) which focused on value creation for the customer. Later research tied in the concept of business performance as well by de-composing marketing capability in to several dimensions. The commonly identified dimensions of marketing capability include: market & customer information management including gathering, disseminating and utilizing relevant information, extracting optimal revenue from customers, channel management, managing communications with customers, selling, assisting product development, and assisting business strategy formation and implementation (Day, 1994; Dutta et al., 1999; Vorhies and Harker, 2000; Vorhies and Morgan, 2005). The impact of all the various dimensions of marketing capability is to increase revenue for the firm through price and quantity effects, i.e. to sell as much as possible at the highest price. Instead of providing a list of capabilities that together comprise marketing capability, a general definition for marketing capability can be crafted.

> *Marketing capability is the ability to use inputs and resources (e.g. financial resources, existing customer base) efficiently to generate desired outputs (e.g. sales). Marketing capability aims to generate the maximum positive influence on the economic value created by the firm through increasing demand (quantity effects) and/or the price customers are willing to pay (price effects).*

Marketing capability may do this by improving the firms understanding of markets and customers (i.e. by working on the firm), or by increasing customers willingness to pay for the firm's products (i.e. by working on the customers).

Hypothesis 1b. *Marketing capability positively affects firm performance*

2.1.3. Operations vs Marketing Capability

The operations function has a strong impact on the cost efficiency of a business as most supply chain and manufacturing activities come under its purview. Marketing is significant for business growth, new business development, and developing and maintaining customer loyalty and brands. In many marketing objectives, operations capability plays a crucial role though the reverse does not usually hold. For example product quality and timely delivery are important for creating customer loyalty, but brand strength is not a necessary antecedent of reducing manufacturing or logistic costs. Since marketing success relies upon operations success but not vice versa, we posit that operational capability will have a stronger positive impact on firm performance than marketing capability.

Marketing capability can provide crucial assistance to a firm in an economic downturn. Marketing's role is to sustain demand, price products appropriately, and assist the firm in introducing new products. One of the important aspects of success during economic downturns is introducing new or modified products at the appropriate price levels. Modifying existing products and creating new ones requires input important input and participation from operations (Morgan, 1999; Olson et al., 2001). Also cost efficient firms will be able to adjust prices better than less efficient ones, even if less efficient ones possess greater marketing capability. Since price sensitivities increase in economic downturns we posit that operational capability will have a greater impact on firm performance during economic downturns than marketing capability.

Hypothesis 2. *On average, operations capability will have a stronger positive effect on firm performance than marketing capability, at all times (i.e. during economic downturns and otherwise).*

There are studies in marketing literature that have included both operations and marketing capabilities in their empirical analysis (e.g. Dutta et al., 1999; Nath et al., 2010). However a need still remains to study the relative effect sizes for operations and marketing capability as existing studies either do not statistically compare the two or compare the effects of sub-capabilities that are only part of the overall functional capabilities. Dutta et al. (1999) and Nath et al. (2010) measure the overall marketing capability and operations capability but do not explicitly test the hypothesis of whether the effect size of one is significantly greater than the other. We used their results and reported statistics to do a comparison and found that difference was not statistically significant. The findings of those two studies are not conclusive in determining which capability has greater effect on firm performance. Also both of these studies only study one or two industries and Nath et al. (2010) study data from a two year period only. This paper on the other hand studies multiple industries over a time period spanning more than a decade.

Krasnikov and Jayachandran (2008) take a meta-analysis approach to testing this hypothesis of which capability has a greater effect on firm performance. They conclude through their meta-analysis that on average the effect of marketing capability is greater on firm performance than that of operations capability. The broader operations capability is composed of sub-capabilities, such as lean manufacturing, quality practices, etc (Tan et al., 2004, 2007). Similarly marketing capability is composed of sub-capabilities, such as understanding customers, creating brands, etc (Vorhies et al., 1999; Vorhies and Morgan, 2005; Morgan et al., 2009). Since individual studies that were part of the meta-analysis were mostly at the level of sub-capabilities as indicated in their study (Krasnikov and Jayachandran, 2008, p. 10), the meta-analysis could only compare the effects of the ‘typical’ operations sub-capability with the effect of a ‘typical’

marketing sub-capability. In such a situation any capability that is composed of a greater number of parts will suffer, as even if the overall capability has a greater effect, each sub-capability may only capture a small part of that effect. Operations capability perhaps suffers from such a research design as it has been sub-divided into many paradigms, technologies and practices such as total quality management (TQM), Just-in-time (JIT), supply chain integration (SCI), quality practices, lean manufacturing, customization, agile supply chains and so forth. The issue of level of analysis (comparing sub-capabilities instead of functional capabilities) cannot be resolved by mere replication of Krasnikov and Jayachandran (2008). Thus we conduct a longitudinal multi-industry analysis at the level of functional capabilities to provide greater insight on this research question.

2.2. Functional Importance

The idea of operations importance and marketing importance has been used in prior research focusing on these functions (Hausman et al., 2002). We define these constructs as:

Functional importance measures top management's support for that function, and top management's perception of the value and role of that function in the achievement of business aims and objectives.

High importance implies a comparatively greater influence, power, and role of the function in business or corporate level decisions and inter-function issues. Functional importance reflects the top management's perspective on how critical the resources and capabilities of a particular function are for achieving corporate goals. A function may have higher importance stemming from the resources and capabilities that lie within it and from the potential of developing resources and capabilities that will be critical in the future.

Functional importance is also linked to greater resourcefulness of the function. One important activity that happens at the higher echelons of a firm is the allocation of scarce resources amongst competing uses. Different functions and groups within the firm vie for the same pool of resources. These resources can be used for asset build-up including human resources, investments in improvements, and other such activities. These activities are generally aimed at increasing the efficiency and effectiveness of the function in accomplishing its goals and contributing to the firm's success. Availability of resources has been related to greater performance of groups within a firm (West and Anderson, 1996). A function with greater importance is more likely to acquire greater resources for itself and hence be better placed to develop and improve desired resources and capabilities. Top management team researchers have found that top managers are influenced by their past experiences in some primary functional areas, and this influence of functional experience on their orientations impacts strategic decision making (Hambrick and Mason, 1984). Thus functions with high importance would be able to influence strategic decision making in their favor. This leads us to the following hypotheses:

Hypothesis 3a. *Importance of operations has a positive effect on operations capability*

Hypothesis 3b. *Importance of marketing has a positive effect on marketing capability*

When a function has high importance, it has more influence over the strategic decision making process. Functional importance impacts the capability of that function to achieve its goals and support firm performance through several ways. Functional importance means greater emphasis and support for that function from the top management. Jaworski and Kohli found that top management emphasis on marketing was positively linked to market-orientation which led to better business performance (Jaworski and Kohli, 1993). When a function enjoys top management emphasis and support, it gains support for improvement programs, investments,

training, hiring, and cross-functional ventures that would be difficult to execute without such support. As the performance of the function will increase, so will the performance of the firm. Thus:

Hypothesis 4a. *Operations importance will positively impact firm performance at all times.*

Hypothesis 4b. *Marketing importance will positively impact firm performance at all times.*

2.3. Economic Downturns

In this paper we test hypotheses in two types of economic conditions, normal conditions of modest economic growth, and economic downturns. Economic downturns are characterized by falling demand and reduced buying power of consumers, and this makes efficiency and cost management crucial for firms. The relationship between functional importance and functional capability is difficult to predict in this context. On one hand the relationship could be positive as functional importance could allow the function greater freedom and scope to take short-term actions aimed at mitigating the effects of recession. On the other hand functional importance may lose its effect on functional capability as firms strained for resources and revenues would not have sufficient resources to invest in capability renewal and development. If capability renewal and development stalls, firms with a prior history of capability development would outperform other firms, even though they may not be undergoing further capability development. This is because we believe functional capability is 'asset stock' type of resource which can be built up by managing 'flows' to it over time (Dierickx and Cool, 1989). Firms can only adjust the flows that build up this resource and not the level of the resource directly, precluding quick acquisition of operational capability once a disruption occurs.

Economic downturns place resource constraints on firms. Recessions reduce the easy availability of resources though some firms may be affected more than others. This change in the

business environment and reduction in the resource availability is likely to change the relationships between functional importance and functional capability as well as between functional capability and firm performance. We investigate empirically whether the proposed relationships change with changing economic conditions without hypothesizing the direction of change a-priori.

Hypothesis 5. *Economic conditions would moderate all the relationships in hypothesis 1a, 1b, 3a, 3b, and 4a, 4b.*

The propositions developed are summarized in Figure 1.

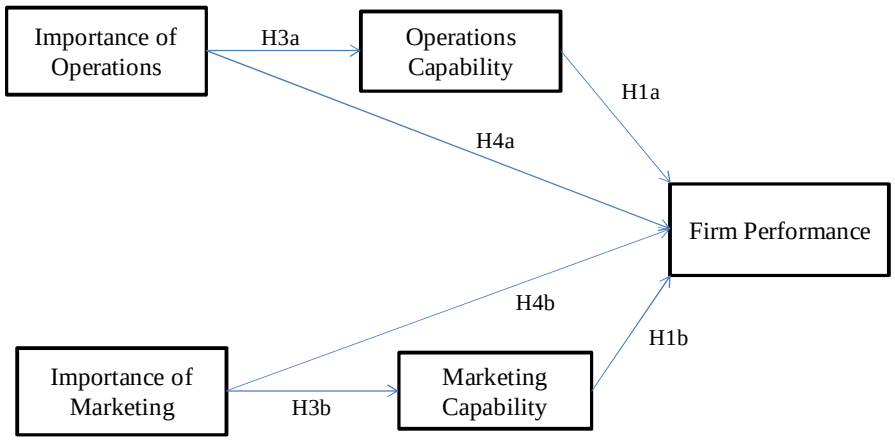

Figure 1. Theoretical Model

Hypothesis 2 compares the relative magnitude of different effects and is hence not illustrated in figure 1.

3. Methodology

We use measures for our concepts based on existing literature that rely on archival data. Financial economists have a long tradition of using financial data as signals of firm quality (Riley, 2001; Connelly et al., 2011). We discuss our research design and sample after giving an overview of our measures for the constructs of interest.

3.1. Measuring Constructs

The constructs are measured based on archival data to allow for a longitudinal sample spanning more than a decade. We adopted or adapted measures used in previously published research.

3.1.1. Efficiency Based Measures

Operationalization of marketing and operations capability and firm performance are based on efficiency scores (maximizing outputs for a given level of inputs) that have been recommended in the strategy and marketing research streams (Dutta et al., 1999, 2005). This efficiency based operationalization of constructs follows from the RBT theory which is an efficiency based view of performance differences (Peteraf, 1993; Peteraf and Barney, 2003). Also RBT defines value as the difference between the price customers are willing to pay and the cost of production, and since resources and capabilities must contribute to this value our operationlization reflects the ability of functions to expand value by increasing revenues or achieving cost efficiencies (Peteraf and Barney, 2003). The efficiency frontier method allows a single efficiency metric to be calculated from multiple outputs and inputs. Data Envelopment Analysis (DEA) (Charnes et al., 1978; Cooper et al., 2006) technique of estimating the efficiency score allows different firms to weight (prioritize) the outputs differently to allow for heterogeneity in firms and their strategies. Since DEA efficiency scores are relative to the other firms used in the analysis, all DEA scores were calculated by industry. Hence a high DEA score reflects relative efficiency with respect to other firms in the focal firms industry only. A brief description of DEA scores is provided in Appendix A.

3.1.2. Operations Capability

The financial metrics used to compute the operations capability score are illustrated in Figure 2. We have adapted the measure of operations capability used by Nath et al. (2010), by including

inventory performance. This is because inventory performance is linked to lead-time and delivery performance as well as cost efficiency (Hult et al., 2002). All operational capability DEA scores were calculated by industry, i.e. each firm was compared with other firms in the same industry only.

Minimizing cost of operations (Cost of goods sold) is the same as maximizing gross profit, which is revenue minus COGS. Since it is desirable to maximize inventory turns, the other outputs must also follow the same direction where greater means better. Hence gross profit, controlled for sales (as sales an input), is used as a desirable output. Any increase in gross profit due to sales and hence marketing capability will be mitigated as that increase will be accompanied by an increase in sales which is an input, while an increased in gross profit from reduction in costs will be reflected more strongly in the DEA scores. The number of employees was used to proxy for cost of labor as the data on wages of labor was missing for most of the firms.

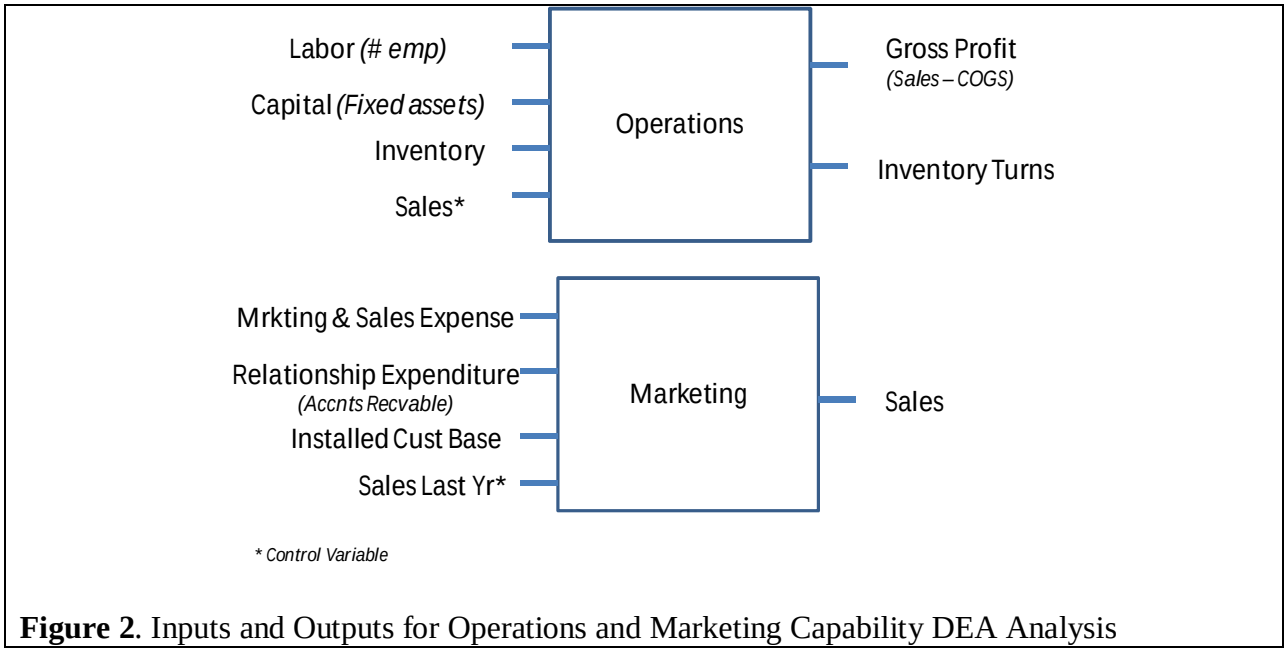

Figure 2. Inputs and Outputs for Operations and Marketing Capability DEA Analysis

3.1.3. Marketing Capability

The inputs for marketing capability are marketing & sales expenditure, relationship expenditure (amount of credit given by firm to buyers), and installed customer base. Last year's sales is added to the inputs as a control variable. The output is "sales" which actually measures the change in sales as last year's sales are an input variable. Figure 2 illustrates the inputs and outputs for marketing capability DEA analysis. To illustrate, high DEA scores would be assigned to firms that show sales growth relative to other firms in the industry assuming all else is equal. If other firms managed to increase sales, while the focal firm sustained its sales performance, it would get a relatively low DEA score. The installed customer base has been measured by the average of last 3 years sales, in accordance with how marketing studies have measured it (Dutta et al., 1999; Nath et al., 2010). All marketing capability DEA scores were calculated by industry, i.e. each firm was compared with other firms in the same industry only.

3.1.4. Functional Importance

High importance implies a comparatively greater influence, power, and role of the function in business or corporate level decisions and inter-function issues. Functional importance is often reflected in the relative compensation of the executive heading a function. Researchers who have studied top management compensation argue that the power and importance of an executive is reflected by his/her compensation (Grabke-Rundell and Gomez-Mejia, 2002). Top Management Team (TMT) literature indicates that compensation signals the quality of the top management (Hambrick and Mason, 1984; Hambrick, 2007) and hence the importance the firm places on that function.It is reasonable to expect firms that place a great deal of importance on a function try to ensure they have the best executive possible to head that function and this would be reflected in the relative compensation of that executive within the firm. Also such firms would ensure there

is adequate incentive for the head of an important function to strive for excellence and hence the pay for that position would tend to be higher ceteris paribus. Compensation of top executives is linked to firm size and the norms of compensation in that firm, e.g. some firms may pay higher wages than others. We use the part of top executive compensation that is unexplained by the firm size and CEO compensation to measure the importance of that function within the firm. Prior researches have also controlled for CEO compensation and firm size when studying compensation of top executives (Finkelstein, 1992; Hambrick and D'Aveni, 1992). This we employ the following measures:

Importance of Operations = Compensation of Top Operations Executive (after controlling for firm size and CEO compensation)

Importance of Marketing = Compensation of Top Marketing Executive (after controlling for firm size and CEO compensation)

3.1.5. Firm Performance

We use pretax return on assets (ROA), pretax return on investment (ROI) and pretax return on sales (ROS) as three comprehensive measures of firm performance. ROA, ROI and ROS are amongst the most widely used accounting measures of firm performance (e.g. Barker and Emery, 2006; Clelland et al., 2006; Larry Pleshko and Inge Nickerson, 2007; Krishnan et al., 2009) as they captures the fundamental task of the firm to generate rents from given resource endowments. Pretax measures are often used to prevent any effects of differential tax treatments, tax holidays, tax carry-forwards etc, from affecting the results. The ROA and ROI measures are a return on inputs type of idea which measures the success of firms by accounting for the resources they used to generate that success. The ROA measure also aligns well with our theoretical

framework of the resource based theory (RBT) (Barker and Emery, 2006; Krishnan et al., 2009). Using ROI and ROS in addition to ROA provides triangulation for our results and demonstrates the robustness of our analysis, because it is extremely unlikely that all three measures will be biased towards the same functional capability.

3.1.6. Economic Downturns

The data time frame of our sample is from 1992 to 2010. This time frame includes a long period of modest economic growth (from 1992 to 2000) and then two recessions as identified by the National Bureau of Economic Research (NBER). NBER is tasked by the US government with determining the start and end of recessions as defined in terms of economic output with gross domestic product (GDP) being a major indicator. NBER defines recession as "a recession is a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales" We prefer to use the term economic downturn instead of a recession to avoid confusion as some economists use different definitions based on GDP figures alone. The major periods of recession and growth are illustrated in Figure 3 below.

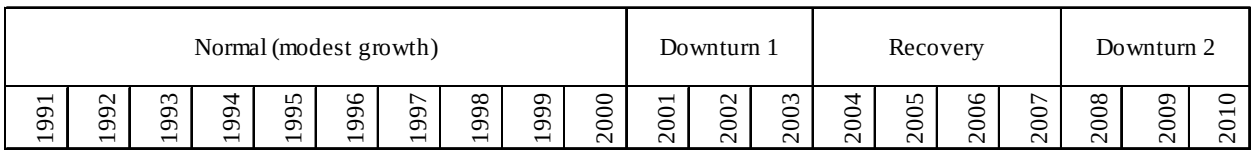

Figure 3. Major time periods in the data

The division of time into these four periods is supported by our sample. Our sample includes a good representation of different industries, and shows that for the downturn years

there is a significant negative impact on firm performance measures that is unexplained by the natural trend over time. More details about the classification of the timeline into four periods is presented in Appendix B.

3.2. Control Variables

Since we are testing for the effects of a capability-based model on firm performance, we must control for plausible alternative explanations. Following Hansen and Wernerfelt (1989), we control for market concentration, and firm size to control for economic explanations of firm performance. We control for CEO compensation to prevent its effects from confounding the effects of our compensation based measures of functional importance. We also control for industry to ensure other industry level influences do not confound our results.

3.2.1. Market Concentration

Firms in different industries face different market concentration levels. Some markets are highly concentrated, while others are fragmented. Prior research shows that firms benefit more from related diversification in concentrated markets where they are one of the major players, than in fragmented highly competitive markets (Christensen and Montgomery, 1981; Jones and Hill, 1988). We control for differences in market concentration by using the Herfindahl index measure computed at the industry level in our analysis.

3.2.2. Firm Size

Firm size can have an impact on a firm's ability to acquire resources & financing (as it has a larger resource base as collateral), gain market power by being lowest price on some products as the cost of that is subsidized by revenue from other products and so forth (Hambrick et al., 1982). We use sales of the firm as an indicator of firm size as we want to control for economic explanations of firm performance. Sales is a more adequate proxy for the economic size of a firm

as it captures its financial size and power rather than physical size. This is important as firms that out-source production may have smaller physical size yet great economic size and power due to their high sales. In other contexts it may be better to use assets or the number of employees (Chen and Hambrick, 1995). We take the log of sales to reduce skew in the distribution of sales.

3.2.3. Industry

We control for the industry by calculating operations capability, marketing capability and firm performance as measures relative to other firms in the respective industry. Also multilevel models are used in the analysis which allows a random intercept to be estimated for each industry and hence adjust for industry differences in profitability.

3.3. Sample

We analyzed all firms found in the Compustat database for the years of 1992 to 2010 that had the required financial and compensation data. Our sample consists of a total of 1868 observations of 671 different firms in 178 industries as identified by 4-digit SIC code. 10-K financial reporting requirements for public firms require that firms report the salary of their top five executives. When collecting compensation data from companies' 10-K financial statements, we used terms like "supply chain", "operations" and "manufacturing" in the title to denote operations managers, and terms like "marketing" and "marketing and sales" to denote marketing managers. Titles with terms involving "retail operations" or "sales operations" were not used as these positions were not exclusively marketing or operations related.

Firms with many divisions would tend not to appear in our sample as the presidents of the divisions would take up the for the top 5 executives for whom salaries must be reported. We compared our sample, with randomly drawn 1000 samples of similar size from our sampling frame (the Compustat database) on key financial indicators of sales, assets, employees, property

plant & equipment, and invested capital. The average p-value results from the 1000 ANOVA tests showed that there was no statistical difference between our sample and the sampling frame (at α=0.1 level) on sales, employees, and invested capital. However our sample had statistically smaller values for assets and property plant & equipment. This resonates with the observation that firms with many large divisions are less likely to be part of our sample. Our results will be directly applicable to single division firms and multi-division firms where the divisions are generally independent and in unrelated business lines. For multi-division firms where the different divisions have synergies or overlapping businesses, the capabilities of one may impact the capabilities of the other. We do not claim strict representation of such multi-division firms in our sample, though we feel there are enough similarities between large single division firms and multi-division firms that our results are likely to apply to such firms as well.

Density plots were analyzed for all variables as highly skewed variables can lead to unbiased estimates. Firm size, market concentration, operations importance, and marketing importance variables were log-transformed to avoid skewed distributions.

The firm performance measures are financial ratios that can sometimes take extreme values either due to data entry errors or for firms that are just starting up or closing down. Such extreme values unduly impact the model. Since we would like our results to represent the majority of firms with established and continuing operations we exclude extreme values of ROA, ROI and ROS. We follow Xin et al. (2010) and others (Daines et al., 2010; Wu, 2010) in truncating the 2.5% most extreme values from the ROA, ROI and ROS ratios.

Table 1 shows the correlation matrix for our sample, and Table 2 shows average values for the variables.

Table 1. Correlation Matrix for the Sample

Pearson Correlations	1	2	3	4	5	6	7	8	9	10	11
1 Ops Capability	1.000										
2 Mkt Capability	0.241	1.000									
3 Ops Importance	0.149	0.187	1.000								
4 Mkt Importance	0.112	0.155	0.739	1.000							
5 ROA	0.193	0.164	0.086	0.051	1.000						
6 ROS	0.147	0.167	0.044	0.029	0.341	1.000					
7 ROI	0.179	0.135	0.077	0.039	0.549	0.190	1.000				
8 Market concentration	0.178	0.321	0.032	0.008	-0.053	-0.039	0.009	1.000			
9 CEO Compensation	0.091	0.127	0.464	0.484	0.045	0.022	0.040	0.034	1.000		
10 Firm Size	0.169	0.408	0.460	0.456	0.153	0.180	0.108	0.020	0.306	1.000	
11 Year (Time)	-0.087	-0.114	0.031	0.094	-0.039	0.017	-0.026	0.016	0.019	0.141	1.000

Table 2. Mean Values by Time Period

	Normal	**Recess 1**	**Recovery**	**Recess 2**
N (# of observations)	752	309	533	382
Average values:				
Ops Capability	0.87	0.85	0.85	0.83
Mkt Capability	0.86	0.83	0.82	0.82
Ops Importance	0.44	0.50	0.51	0.45
Mkt Importance	0.34	0.42	0.42	0.37
ROA (%)	10.04	3.33	6.85	5.75
ROS (%)	8.33	1.53	6.53	5.14
ROI (%)	14.63	4.24	9.34	7.79
Market Concentration	0.19	0.20	0.20	0.19
CEO Comepnsation (mil $)	0.75	1.05	0.88	0.78
Firm Size	6.04	6.21	6.48	6.58

4. Results

The model shown in Figure 1 was tested by using Hierarchical Linear Modeling (HLM) analysis. The equations for the model are presented below.

Firm Performance

Level 1:

$$FirmPerf_{ijt} = D.\left[\beta_{ij}^{0} + \beta_{ij}^{1} Year_{ijt} + \beta^{2} Ops.Importance_{ijt} + \beta^{3} Mkt.Importance_{ijt} + \beta^{4} Ops.Capability_{ijt} + \beta^{5} Mkt.Capability_{ijt} + \beta^{6} FirmSize_{ijt} + \beta^{7} MarketConcentration_{jt} + \beta^{8} CEO.Compensation_{ijt}\right] + \varepsilon_{ijt}$$

$$\varepsilon_{ijt} \sim N(0, \sigma^{2})$$

Level 2:

$$\beta_{ij}^{0} = \gamma_{0}^{0} + u_{j}^{0} + u_{ij}^{0} \qquad \beta_{ij}^{1} = \gamma_{0}^{1} + u_{ij}^{1}$$

$$\begin{bmatrix} u_{ij}^{0} \\ u_{ij}^{1} \end{bmatrix} \sim N(\vec{0}, \boldsymbol{G}) \qquad u_{j}^{0} \sim N(0, \tau^{2})$$

Operations Capability

Level 1:

$$Ops.Capability_{ijt} = D.\left[\beta_{ij}^{0} + \beta_{ij}^{1} Year_{ijt} + \beta^{2} Ops.Importance_{ijt} + \beta^{3} FirmSize_{ijt} + \beta^{4} MarketConcentration_{jt} + \beta^{5} CEO.Compensation_{ijt}\right] + \varepsilon_{ijt}$$

$$\varepsilon_{ijt} \sim N(0, \sigma^{2})$$

Level 2:

$$\beta_{ij}^{0} = \gamma_{0}^{0} + u_{j}^{0} + u_{ij}^{0} \qquad \beta_{ij}^{1} = \gamma_{0}^{1} + u_{ij}^{1}$$

$$\begin{bmatrix} u_{ij}^{0} \\ u_{ij}^{1} \end{bmatrix} \sim N(\vec{0}, \boldsymbol{G}) \qquad u_{j}^{0} \sim N(0, \tau^{2})$$

Marketing Capability

The model for Marketing Capability is also exactly similar to the one for Operations Capability with marketing variables replacing the operations variables.

D is a factor variable indicating the four time periods in the study (i.e. Normal, Downturn 1, Recovery, and Downturn 2) and moderates the entire model. Superscripts are used to enumerate

the fixed and random effects. The subscript *i* indexes over the firms, the subscript *j* indexes over the industries, and the subscript *t* indexes over the observations from different years of a particular firm.

The use of mixed models is justified because we cannot assume independence of observations that are nested within industries. Two firms within the same industry share more commonalities than 2 firms across widely different industries. Also the use of hierarchical models (HLMs) is appropriate because we have significant variance of firm performance (14.6% for ROA) between industries indicating that pooling all the observations together (ignoring industry) would not be accurate. The model was estimated using the restricted maximum likelihood (REML) estimation approach which is widely accepted and the default in most statistical packages, e.g. SAS PROC MIXED.

Table 3 shows the results of testing the effects of functional importance and capability on the firm performance measure of ROA. Results for ROI and ROS are exceedingly similar and are shown in appendix C. ROS and ROI provide triangulation to our results and corroborate them. Table 3 shows the results of testing the first part of our model where importance affects capability. Pseudo R^2 statistics are reported based on the approach of Xu (2003) and Gelman (2006).The models presented in Table 3 and Table 4 have very favorable pseudo R^2 values compared to existing published studies on functional capabilities (Nath et al., 2010) and executive compensation (e.g. Coughlan and Schmidt, 1985; Abowd, 1990).

Table 3. Results of HLM Analysis on the effects of Importance and Capability on Firm Performance

Dependent var: Firm Perf (ROA)	**Normal**	**Downturn 1**	**Recovery**	**Downturn 2**
Intercept	-7.481	-23.028 ***	-23.286 ***	-24.233 **
	5.62	*6.710*	*5.240*	*9.173*
Marketing Capability	13.430 ***	21.329 ***	8.381 **	2.653
	3.225	3.972	2.840	4.140
Operations Capability	27.274 ***	16.367 ***	24.302 ***	19.657 ***
	2.687	*3.454*	*2.560*	*3.231*
Marketing Importance	6.209 ***	0.190	0.472	7.032 ***
	1.630	*1.903*	*1.194*	*1.990*
Operations Importance	1.477	4.455 **	2.518 *	-2.990
	1.258	*1.597*	*1.240*	*1.972*
Control Vars:				
Market Concentration	-0.274	1.040	-1.852 †	-0.251
	0.920	*1.159*	*1.018*	*1.270*
Year (time)	-0.570 **	0.798	0.149	1.950 **
	0.215	*0.647*	*0.404*	*0.613*
CEO Compensation	0.000	0.000	0.000	0.001
	0.001	*0.000*	*0.001*	*0.001*
Firm Size	-1.824 ***	-0.389	-0.073	-0.721
	0.540	*0.685*	*0.478*	*0.614*

Pseudo R-squared = 35.47%, AIC = 14131.48, BIC = 14357.52, Log Liklihood = -7024.738

Significance: *** < 0.001, ** < 0.01, * < 0.05, † ≤ 0.1

4.1. The Effect of Marketing and Operations Capabilities on Firm Performance

Hypothesis 1a and 1b are strongly supported as the results show strong positive and consistent effects of marketing efficiency and operations efficiency on all three measures of firm performance (see Table 3 for effects on ROA). Figure 4 illustrates the effect sizes of functional capabilities on firm performance (ROA) for the 4 periods along with 90% confidence interval bars. The height of the circle in the middle of the vertical bars from the horizontal zero-line represents the size of the effect. The lengths of the bars on each side of the circle represent the uncertainty in estimating the effect size. If the bars do not cross the zero-line then the effect is statistically significant.

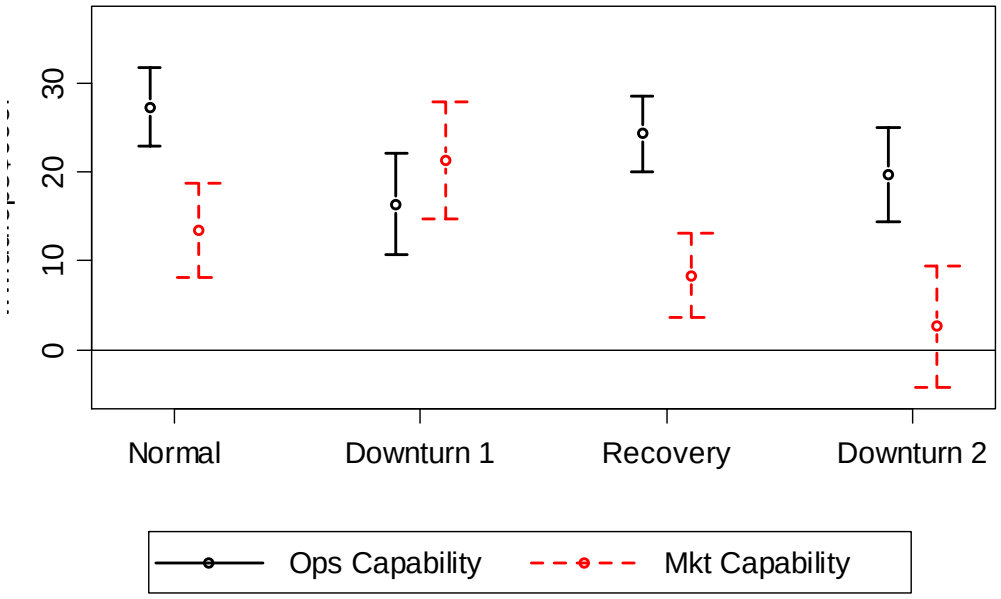

Figure 4. Effect sizes for Operations and Marketing capability on Firm Performance

The effect of operations capability is very high and consistent throughout the periods indicating the centrality of operations to firm performance at all times. Marketing on the other hand has high effect sizes in the initial two periods but then much lower effect sizes later on. It is interesting to note that effect for marketing capability moves up significantly in downturn 1 and falls in downturn 2. We believe this is because downturn 1 was caused by a stock market bubble which affected firms directly but not end consumers as much. End consumers still had more purchasing power in downturn 1 as compared to downturn 2. Downturn 2 was much deeper for all levels of society, creating high unemployment in the US and greatly reducing the purchasing power of consumers. This shows that marketing capability and brand strength can only go so far in enabling firm performance in adverse economic conditions. When the conditions hurt the purchasing power of consumers in a very significant way marketing capability is less important.

This is supported by the fact that operations capability effect size is significantly greater than the effect size for marketing capability during downturn 2.

Hypothesis 2 is strongly supported as in 3 of the 4 periods the effect of operations capability is statistically significantly greater than marketing capability at the α=0.5 level. In figure 4 this is represented by the confidence interval bars not overlapping for operations and marketing. In downturn 1 the effects of operations efficiency and marketing efficiency are pretty similar. This indicates that in general operational capability is of greater importance, as it explains more variance in the firm performance, for firms than marketing capability. We believe this result stems from the greater scope of the operations task. Operations task includes sourcing or purchasing, manufacturing, transportation and warehousing, as well as reverse logistics of customer returns and product disposal. This greater scope of activities places operations at a unique strategic position where it has greater opportunity to impact firm performance in many different ways than other functions. It is due to this greater opportunity, and not due to some inherent superiority of operations over marketing, that operations capability has a stronger effect on firm performance. This suggests that the operations function should be treated with strategic importance due to its great significance for firm performance.

4.2. The Effect of Functional Importance on Functional Capabilities

The effect of marketing importance on marketing capability and operations importance on operations capability during the 4 time periods is shown in Table 4 and illustrated in Figure 5. Figure 5 shows the effect of each function's importance on that functions capability, with the circle (dot) representing the estimated effect size and the vertical bars representing the 90% confidence interval for the effect size. Hypothesis 3a and 3b are supported with significant effects from importance of functions to the capability of functions. The Pseudo R^2 values are

between 10 and 18%, showing that importance, though statistically significant, is likely to be one of several factors that explain functional capability.

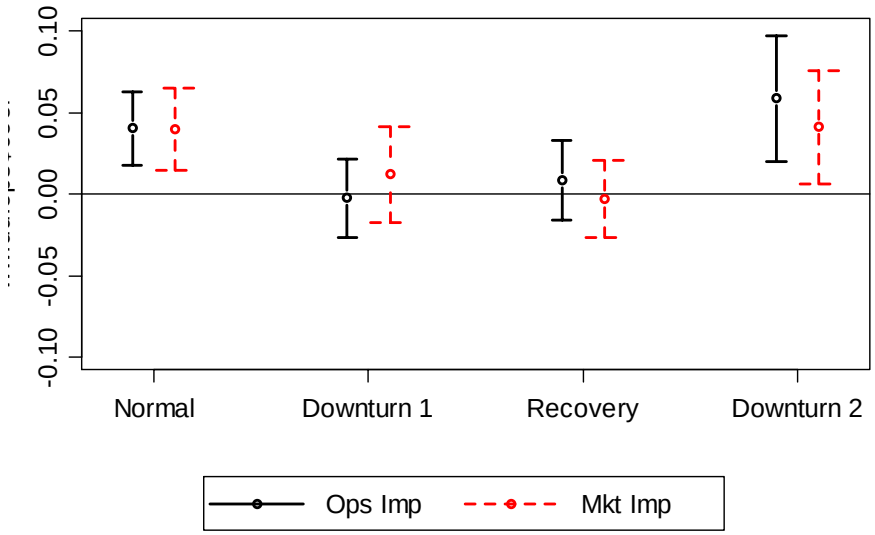

Figure 5. Effect sizes for Functional Importance on Functional Capability

This is expected as marketing and operations capabilities require a lot more than just top management importance to be developed. For both operations importance and marketing importance the effect falls during downturn 1 and the following recovery period. The fall of the effect of operations importance during the middle two periods is statistically significant as compared to its effect during the normal period. This shows that operations capabilities are not easily acquired by focus and support from top management alone. Such capabilities generally require long term investments in structural systems and infrastructural practices like work-force training and engagement.

Table 4. Results of HLM analysis of the effects of importance on capability

Dependent var: Marketing Capability	Normal	Downturn 1	Recovery	Downturn 2
Intercept	0.727 ***	0.576 ***	0.651 ***	0.721 ***
	0.049	*0.066*	*0.050*	*0.093*
Marketing Importance	0.040 **	0.012	-0.003	0.041 *
	0.015	*0.018*	*0.014*	*0.021*
Control Vars:				
Market Concentration	0.017 †	0.030 *	0.066 ***	0.092 ***
	0.010	*0.013*	*0.011*	*0.013*
Year (time)	-0.008 ***	0.014 †	-0.017 ***	0.001
	0.002	*0.008*	*0.005*	*0.008*
CEO Compensation	0.000	0.000	0.000	0.000
	0.000	*0.000*	*0.000*	*0.000*
Firm Size	0.039 ***	0.054 ***	0.066 ***	0.055 ***
	0.005	*0.008*	*0.005*	*0.006*

Pseudo R-squared = 10.24%, AIC = -2221.703, BIC = -2060.071, Log Likelihood = 1139.852

Dependent var: Operations Capability	Normal	Downturn 1	Recovery	Downturn 2
Intercept	0.832 ***	0.683 ***	0.697 ***	0.966 ***
	0.055	*0.067*	*0.059*	*0.100*
Operations Importance	0.040 **	-0.002	0.008	0.059 *
	0.014	*0.015*	*0.015*	*0.023*
Control Vars:				
Market Concentration	0.031 **	0.036 *	0.037 **	0.044 **
	0.012	*0.015*	*0.014*	*0.017*
Year (time)	-0.013 ***	-0.001	0.010 †	-0.008
	0.003	*0.008*	*0.005*	*0.007*
CEO Compensation	0.000	0.000	0.000	0.000
	0.000	*0.000*	*0.000*	*0.000*
Firm Size	0.018 **	0.037 ***	0.026 ***	0.018 *
	0.007	*0.008*	*0.006*	*0.008*

Pseudo R-squared = 18.33%, AIC = -1841.021, BIC = -1679.434, Log Likelihood = 949.5106

Significance: *** < 0.001, ** < 0.01, * < 0.05, † ≤ 0.1

4.3. The Direct Effects of Functional Importance on Firm Performance

Hypothesis 4a and 4b are also supported as we find significant effects on firm performance of both marketing importance and operations importance. Figure 6 illustrates the effects of operations importance and marketing importance on firm performance (ROA), with the vertical bars representing the 90% confidence interval.

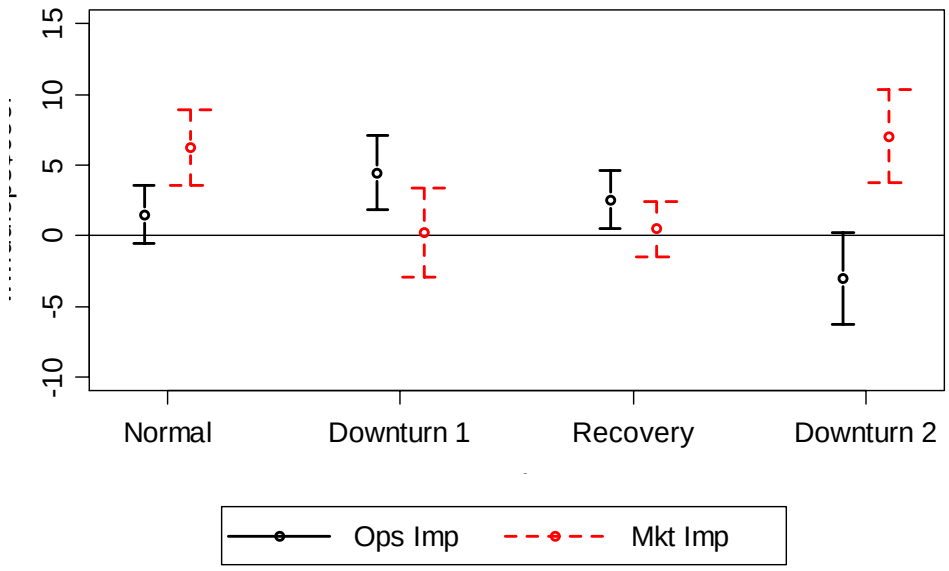

Figure 6. Effect sizes for Operations and Marketing Importance on Firm Performance

This means that these constructs explain addition variance in firm performance than that explained by operations capability and marketing capability. Thus functional importance has a direct effect on firm performance and an indirect effect mediated through functional efficiency. The direct effect is of importance as it indicates that high quality top management teams matter, as they can initiate short-term competitive moves, be responsive to external conditions, and do value creating short term management in addition to their long term benefit of building operations and marketing capabilities.

All three firm performance measures follow a similar pattern for the effects. The effect of marketing importance is high in downturn 2, whereas the effects of operational importance are high in the middle two periods. These direct effects of functional importance on firm performance during downturns capture the significance of adaptive measures taken by firms. The effect of operations importance and marketing importance are contingent on environmental conditions. Some conditions are not suitable for short-term adaptive moves that yield immediate

performance benefits, while others are. In extreme downturns like downturn 2, marketing controls pricing, and hence can create value in the short term through optimal price management.

Operations importance is not significant in environment conditions of munificence (normal period) and extreme recession (downturn 2). This can be explained by the fact that in a growing economy firms who don't give much importance to operations can also grow and succeed. When conditions are not good such as during downturn 1 and recovery periods, the impact of operations importance becomes significant. However in extreme recessions when consumers face drastically reduced purchasing power, operations importance is again unable to provide competitive advantage as the conditions over-power any short-term competitive moves.

We emphasize that the operations capability is more strongly linked to performance in downturn 2 than marketing capability even though operations importance does not have a significant effect. This is because operations capability improves the cost efficiency of the firms operations and manufacturing tasks and thus allows the firm to reduce prices and offer new or modified products at new price points more suitable to a downturn.

5. Discussion and Conclusions

Our findings show that operations capability has a stronger effect on firm performance on average than marketing capability in economic downturns and otherwise (hypothesis 2). Since our sample was large and longitudinal we feel that the result adequately captures the average broad-brush situation. We acknowledge that examples and situations exist where marketing capability may be crucial for the very survival of the firm, and we are not suggesting that firms exclusively focus on operations at the expense of marketing, but we are emphasizing the central role of operations in realizing profitability and competitive advantage for firms.

We find that the effect of marketing importance on marketing capability is larger (when significant) than that of operations importance on operations capability (when significant). This points to interesting differences between the operations task and the marketing task. Improving the operations of a company often requires long term improvement programs and business process re-engineering that affects many levels of the organizations. From workers on an assembly line or warehouse to managers overseeing logistics and inventory, to senior managers making process and facility decisions, all must be involved to make the operations task fit the strategic priorities of the company and optimize it along relevant dimensions such as quality and flexibility. The marketing task however does not usually involve that great a number of people spread over that many different levels. The operations head usually faces a much larger managerial scope than the head of marketing. That is why while the marketing head can single handedly make great impact by new ideas or organization, and new marketing strategies and their execution, the operations head requires the joint effort of a great many different people over longer periods of times to make significant changes. For example re-organizing the production process is a much larger effort involving a great number of people, than changing the advertising strategy of a company to target some new customer segment.

We do not suggest that one activity is more important than the other, as that would depend on the context, but it is to suggest that changes require greater managerial scope, a greater number of people, and perhaps greater effort in operations than in marketing usually. This explains why greater operations importance has a significant yet weaker effect on the operations capability than that of marketing.

Our work makes contributions to key areas in management. We contribute to the work on strategy and organizational competence by adding to the debate on where capabilities come

from. Strategy literature has posits, as part of the RBT, that non-imitable and non-substitutable organizational capabilities and resources provide competitive advantage and explain the heterogeneity in organizational performance (Wernerfelt, 1984; Barney, 1991; Amit and Schoemaker, 1993). The question of where capabilities come from has not received as much attention as the impact of those capabilities once acquired (Ethiraj et al., 2005). Our model and empirical evidence suggests that top management teams affect firm performance through impacting which capabilities get developed. We provide empirical evidence that importance given to a function impacts the capability development in that area. Our work provides a link between the top management team research literature (Hambrick and Mason, 1984; Hambrick et al., 1996; Hambrick, 2007) and the RBT. For the TMT stream, it provides further evidence that the actions of top managers can impact firm performance through influencing organizational capabilities. For RBT it provides evidence that top management team is a resource that affects organizational capability development. The results show that it is not just the characteristics of the top management that matter, but also what they do in terms of importance and focus. Also it shows that the importance given by top management loses its influence in recession. This hints to the effects of top management being contingent on economic conditions, a theme unexplored in current top management research.

Our paper also contributes to the work on firm resilience which is the ability to adapt to adversity. We show that lever of functional importance is not always effective for capability development as it is not significant in some economic conditionsin recessions (Figure 3) though functional capability remains significant in increasing firm performance. More importantly operations importance positively impacts firm performance in recessions over and above the impact of operations capability. Hence top management must give importance and focus to the

operations function in addition to focusing on capability development to survive adversity. We also show that operational capability is of great importance at all times, and firms cannot afford to not develop this capability. This provides evidence counter to what some marketing studies have proposed, where marketing capability takes center stage (Krasnikov and Jayachandran, 2008).

Future Research

This study suggests that operations capability is more important due its greater scope and opportunity in impacting firm performance than marketing. What needs to be investigated next is what are the efficient ways of acquiring or developing operations and marketing capabilities. Also the effects of outsourcing large parts of the operations task, such as to third party logistics providers, need to be evaluated to see how much have they leveled the playing field and what still gives heterogeneity to firms in their operations capability. The results of this study suggest that future research should investigate relationships contingent on economic conditions, as some relationships vary greatly under recessionary conditions. Top management research, for example, can study the effects of manager characteristics and focus on firm capabilities and performance as being moderated by economic conditions.

Appendix A

Decisions Envelopment Analysis

Data Envelopment Analysis (DEA) analysis takes a group of entities, referred to as decision making units (DMUs) in the DEA literature, and calculates an efficiency score for each entity (firm) in the group. The efficiency score (ε_i) for firm *i* is calculated by maximizing the following ratio of a weighted average of outputs to the weighted average of inputs (Cooper et al., 2004):

$$\varepsilon_i = \frac{\sum_{j=1}^{s} u_j y_{ji}}{\sum_{k=1}^{m} v_k x_{ki}}$$

The outputs are represented by the y's and the inputs by the x's. The weights u_j and v_k (which must all be positive) are chosen such that the efficiency score ε_i for firm *i* is maximized, subject to the efficiency scores for all firms (including firm *i*) not exceeding 100% when the chosen weights (u_j and v_k) are applied to them. This gives each firm the benefit of the doubt, weighting the outputs and inputs to make it look as good as possible without choosing a set of weights that makes any firm exceed 100% efficiency (Zhu, 2009). Thus DEA maintains comparability of the efficiency scores (ε_i) while allowing different firms to optimize different outputs in accordance with their strategies. The DEA analysis is illustrated by Figure 1, using the simple case of one input and one output. The firms connected by the line form the empirically estimated efficiency frontier, and all firms on this line get an efficiency score of 1. The firms below the line get efficiency scores less than 1. The greater the distance between the inefficient firms and the frontier, the lower is their score. For this paper an input oriented DEA was performed with the variable returns to scale option.

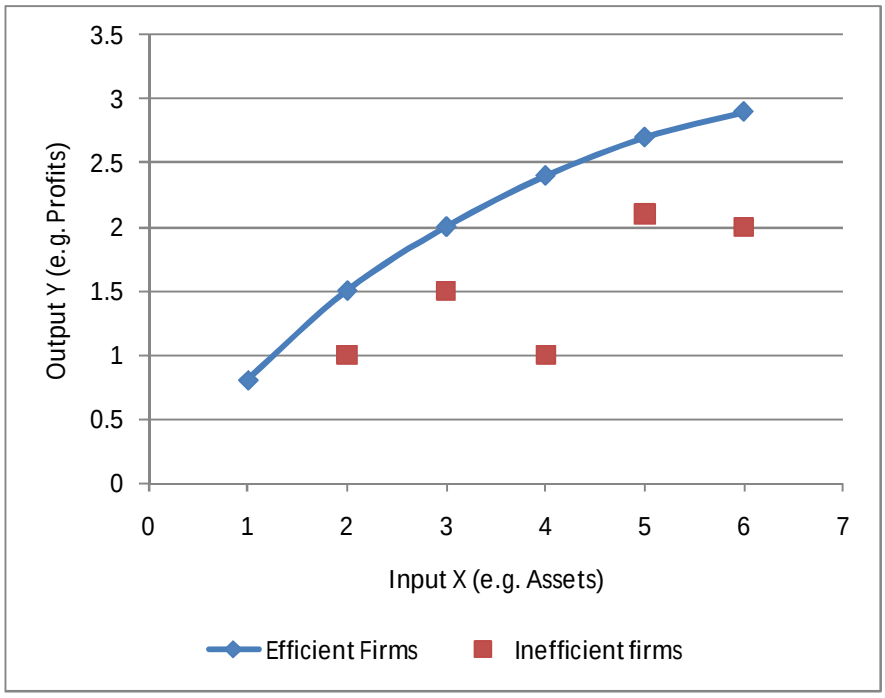

Figure A.1. DEA illustration.

Appendix B

Identification of "Downturn" Periods in our Timeline

According to official declarations of National Bureau of Economic Research (NBER) our sample contains two recessionary periods, the first starting in 2001 and the second in 2008. In our analysis we use the term "downturn" to refer to adverse business conditions to avoid being limited by the strict economic definition of recession and to avoid confusion with different definitions of recessions. According to NBER the end of the trough in economic output which marks the end of a recession was experienced towards the end of 2001 for the first recession.

However based on other measures of economic performance, and the financial statistics of our sample, we mark 2001 to 2003 as a recessionary period.

NBER only looks at output based measures to determine recession. When firms face declining sales and economic activity they often lower their prices, and an increase in output is often the first signs of a recovery. However from a firm profitability point of view an increase in output from the low of the recession may simply be due to price decreases and discounts while firms still face extreme downward pressures on profitability. As such stock market performance is often used as an indicator on when firms are getting back to profitability after a recession. The crash of the Dow Jones Industrial Index in the aftermath of tragic terrorist attacks on the United States in 2001 had followed closely on the heels of the Nasdaq crash in 2000 due to the dot-com bubble. The stock market data, as well as unemployment figures, paint a recessionary picture for 2002 and most parts of 2003 ("Early 2000s Recession," n.d.). Based on unemployment statistics and stock market data the 2001 recession ended in the latter half of 2003 ("Early 2000s Recession," n.d.). This agrees with our data sample as well, which shows a highly significant and strong negative effect in firm performance measures across industries for the years 2001, 2002, and 2003, while significantly improving in 2004. The negative effects of 2002 and 2003 are extremely close in magnitude to the effects in 2001 and 2008 (the two years considered officially as recession by NBER). Hence the first recessionary period is defined as 2001, 2002 and 2003 in the analysis.

The second recession started in December 2007 as officially declared by the National Bureau of Economic Research (NBER) (Isidore, 2008). This recession was deemed to have ended in mid 2009 by NBER ("Announcement of June 2009 business cycle trough/end of last recession," 2010). However, based on unemployment figures, low consumer confidence,

escalating financial debt crisis, inflation figures and consumer perceptions ("Late 2000s Recession," n.d.) 2009 and 2010 were "*recessionary*" years and hence part of our downturn period. This is corroborated by our sample which shows low performance on average of firms in 2009 and 2010. Our results are not sensitive to the inclusion of 2010, and hence even if 2010 is excluded our conclusions do not change.

Prior to the 2001 recession the North American economy was growing. According to NBER the US economy experienced 10 years of economic expansion starting from March 1991 till 2000 (Hall et al., 2001), at an annual GDP growth rate which was above 3% on average. The recessionary periods brought on an unexpected and sharp decline in demand. Job losses, spending cuts by firms, and reduced consumer spending due to perceived economic downturn contributed to decreasing demand. The period after the first downturn is labeled recovery to reflect the fact that it is situated right after a significant sustained downturn. This is because even though GDP figures may reflect modest growth in this period, we cannot claim this period to be similar to the initial 1990s time period as firms and consumers would have been affected by the recent recession financially and psychologically. Due to the great difference in the economic environment faced by companies in the 1990s and then in the times of recession, any fair longitudinal analysis must incorporate this difference in the statistical model. We treat all four time periods separately instead of merging recessions and non-recessions together as downturns may have different characteristics and a period of modest growth between two downturns may not be the same as a long sustained period of modest economic growth.

Appendix C

Results of the impact of importance and capability on the firm performance measures of ROI and ROS

The results of our analysis on ROS and ROI corroborate the results presented based on ROA as the firm performance measure in the paper.

Dependent var: Firm Perf (ROI)	**Normal**	**Downturn 1**	**Recovery**	**Downturn 2**
Intercept	-8.550	-34.885 ***	-38.523 ***	-30.305 *
	8.387	*10.302*	*8.102*	*14.210*
Marketing Capability	15.238 **	30.861 ***	7.339 †	2.246
	4.856	6.075	4.417	6.385
Operations Capability	40.166 ***	22.168 ***	33.443 ***	29.417 ***
	4.038	*5.302*	*3.987*	*5.087*
Marketing Importance	9.369 ***	1.330	0.065	10.825 ***
	2.446	*2.927*	*1.864*	*3.158*
Operations Importance	2.408	4.423 †	1.780	-1.814
	1.904	*2.476*	*1.955*	*3.088*
Control Vars:				
Market Concentration	-0.402	1.728	-2.145	0.440
	1.377	*1.756*	*1.535*	*1.933*
Year (time)	-0.795 *	0.991	0.717	3.409 ***
	0.323	*0.992*	*0.629*	*0.944*
CEO Compensation	0.000	0.000	0.003 *	-0.003
	0.002	*0.000*	*0.002*	*0.002*
Firm Size	-2.397 **	-0.152	0.451	-1.377
	0.810	*1.058*	*0.744*	*0.953*

Pseudo R-squared = 32.11%, AIC = 15693.26, BIC = 15919.3, Log Liklihood = -7805.628

Dependent var: Firm Perf (ROS)	**Normal**	**Downturn 1**	**Recovery**	**Downturn 2**
Intercept	2.096	-36.595 ***	-23.286 ***	-41.787 **
	6.787	*8.090*	*6.275*	*11.109*
Marketing Capability	12.325 ***	30.170 ***	7.895 *	6.147
	3.643	*4.733*	*3.415*	4.999
Operations Capability	25.447 ***	27.194 ***	24.551 ***	22.185 ***
	3.008	*4.322*	*3.101*	*4.014*
Marketing Importance	7.133 ***	0.889	0.299	7.904 **
	1.735	*0.889*	*1.424*	*2.438*
Operations Importance	1.350	4.987 **	2.852 *	-4.523 †
	1.445	*1.863*	*1.475*	*2.407*
Control Vars:				
Market Concentration	-0.129	-0.172	-3.336 **	-3.593 *
	0.973	*1.333*	*1.172*	*1.508*
Year (time)	-0.345	1.391 †	0.198	2.513 ***
	0.232	*0.778*	*0.486*	*0.730*
CEO Compensation	0.001	0.000	0.000	0.002 †
	0.001	*0.000*	*0.001*	*0.001*
Firm Size	-2.967 ***	-1.593 *	-0.533	-0.907
	0.607	*0.810*	*0.576*	*0.758*

Pseudo R-squared = 31.58%, AIC = 14685.69, BIC = 14911.7, Log Likelihood = -7301.844

Significance: *** < 0.001, ** < 0.01, * < 0.05, † ≤ 0.1

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