WHY DO FIRMS TRADE-OFF OR ACCUMULATE OPERATIONS CAPABILITIES? 
COMPEITITION BASED EXPLANATION FROM THE DYNAMIC CAPABILITIES VIEW

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ABSTRACT

A major question in the operations strategy area is what firms do with their operations capabilities. Two competing views have been proposed: (1) trade-off (2) cumulative capabilities model. While both have some empirical support, the broader question on why firms would trade-off or accumulate capabilities hasn’t been addressed. This paper uses the DCV explanation. DCV is an original suggestion and proposes that a firm’s choice depends on the level of competition faced in its business environment. Results suggest that competition based on DCV, is a potential explanation of firms’ choice and provides an improved explanation on firm’s behaviour.

Keywords: Operations strategy, operations capabilities, dynamic capabilities view (DCV), competition

INTRODUCTION

With increasing levels of competition, firms are under pressure to strategically develop and deploy their capabilities to generate competitive advantage. Capabilities describe the method by which resources are arranged to effect a desired end (Amit & Schoemaker, 1993). The core operational capabilities are cost efficiency, quality, delivery or dependability and flexibility (Hayes & Wheelwright, 1984; Hill, 1995). Substantial research has been done to show that firms treat these capabilities in two distinct ways (Avella et al., 2011). Some firms apply the “trade-off” model where they are selective and focus on one or two capabilities to compete on, while de-emphasizing the other capabilities as competitive priorities (Boyer & Lewis, 2002; Hayes & Wheelwright, 1984; Skinner, 1969). Other firms apply the “cumulative capabilities” model where they compete on multiple capabilities simultaneously (Ferdows & De Meyer, 1990; Flynn & Flynn, 2004; Nakane, 1986; Noble, 1995). Both models have intuitive appeal and have also received some empirical support. However, these models do not address the broader question as to why a firm would trade-off or accumulate capabilities.

In this paper, we specifically address the question as to why firms trade-off or accumulate capabilities. A review of the literature shows that while there is a paucity of research on this question, the few studies that have addressed this question have focused on one theoretical explanation. This explanation uses the performance frontier theory (Clark, 1996; Schmenner
Nand and Singh

Why do firms trade-off or accumulate operations capabilities?

& Swink, 1998). According to this theory, firms have two performance frontiers: asset and operating frontiers. The asset frontier represents the highest value performance that an organisation delivering a particular product can create at a given cost with the help of the best available technologies, skills, management techniques and purchased inputs (Porter, 1996). Operating frontier, on the other hand, is the actual performance a firm is able to generate from the resources that are available to it. The gap between asset and operating frontiers can be thought of as the “available capacity” and affects the ability of the firm to accumulate capabilities. If the gap is large, there is available capacity for a firm to accumulate capabilities. If the gap is small, the choice is restricted to trading off capabilities. Schmenner and Swink (1998) and Vastag (2000) are the original exponents of this theoretical explanation. They have called this the “integrated model”.

While this integrated model has intuitive appeal, it lacks strong empirical support. Lapre and Scudder (2004) along with Ramdas and William (2006) appear to be the only two closely linked studies that have tested aspects of this model. Both studies were based on the U.S airline industry and part of the findings indicated that trade-offs occurred when airlines were operating close to asset frontiers. However, the veracity of these findings is doubtful because there are some major limitations to these studies. Both these studies focus on only one of the frontiers (i.e., asset frontier) and involve two out of the four operational capabilities (i.e., cost efficiency and quality). These limitations therefore have not led to the full testing of the performance frontier theory based explanation for why firms trade-off or accumulate capabilities.

Given the relatively weak empirical support for the performance frontier theory based explanation presented in the literature, we propose another explanation for why firms trade-off or accumulate capabilities. This explanation is based on the dynamic capabilities view perspective and focuses on the level of competition that a firm faces from its competitors in its business environment. The dynamic capabilities view allows organisations to be able to adapt to, integrate, and reconfigure internal and external organisational skills, resources, and functional capabilities so that they strategically fit the requirements of change (Teece et al., 1997). Therefore, based on this theory, we posit that competition forces firms to act and react by changing and reconfiguring their operations capabilities (Teece, et al., 1997). We assume that strong competition can potentially result in firms either engaging in accumulation or trading-off of their operational capabilities.

In this paper, we present the results of a study that assesses the influence of competition (based on dynamic capabilities view) on the decision of firms to trade-off or accumulate capabilities. Our study focuses on the Australian civilian airline industry. Objective longitudinal data from publically available sources on the four operational capabilities, and competition measures for the dominant airlines were used to test the research question of why a firm would trade-off or accumulate capabilities.

Our study makes a number of key contributions. Our new explanation on the impact of competition on firm’s choice to trade-off or accumulate capabilities provides fresh insights and perspectives on managerial decisions undertaken by firms in a dynamic business environment. This study therefore provides guidance to managers on when trade-off or
accumulation situations are likely to arise. From a theoretical perspective, this study brings us closer to understanding the strategic choices that firms make, therefore enhancing current pool of knowledge relating to firms and their strategic deployment of operational capabilities. From a methodology perspective, we applied longitudinal secondary data from a range of public sources as proxy measures of all the variables in this study. Use of such data helps to overcome the methodological weaknesses of cross-sectional perceptual data that has predominantly been used in previous studies in this area.

The remainder of this paper is organized as follows: Section 2 provides the theoretical background on operational capabilities, and the dynamic capabilities view, which lead up to the articulation of the hypotheses framed to test the research question; Section 3 discusses the research methodology; Section 4 presents the findings of the study; Section 5 discusses the results and implications of the study; and, Section 6 concludes with the description of the limitation of the current study and further research opportunities.

THEORETICAL BACKGROUND

Operations Capability Models

The development and arrangement of capabilities is an important decision for firms and can offer significant prospects for attaining new sources of competitive advantage. Capabilities serve to directly demonstrate and indicate the economic outcome of a firm (Hallgren et al., 2011; Koufteros et al., 2002). Hence, the relationship between capabilities such as cost efficiency, quality, delivery and flexibility is critical and has been the focus of much of the research in the operations strategy literature (Hallgren, et al., 2011). The relationships amongst the operational capabilities have been described as cases of either trade-offs or accumulation of capabilities.

Predominantly rooted in the works of Skinner (1969), trade-offs amongst capabilities are deemed necessary when developing an appropriate operations strategy. The concept of trade-offs is achieved by focusing on a few capabilities at a time (Spring & Boaden, 1997). This model has been empirically tested and supported in several studies (Boyer & Lewis, 2002; Pagell et al., 2000; Safizadeh et al., 2000). The alternative model involving accumulation of capabilities was initially proposed by Ferdows and De Meyer (1990), and Noble (1995), and empirically supported by Flynn and Flynn (2004). These studies show that operations capabilities frequently develop along multiple dimensions simultaneously therefore leading to the idea of cumulative capabilities. The differences between these two models have resulted in researchers seeking to reconcile them via the proposed integrated model (Clark, 1996; Hayes & Pisano, 1996; Lapré & Scudder, 2004; Schmenner & Swink, 1998). The idea behind this integrated model is that whilst operations strategy can be looked at from a trade-off and an accumulation position, they both share complementary viewpoints under the theory of performance frontiers (Clark, 1996; Hayes et al., 1996; Porter, 1996).
Performance Frontier Theory and its Limitations

Schmenner and Swink (1998) proposed the theory of performance frontiers, positing the existence of two types of performance frontiers: asset and operating frontiers. Under this model, capabilities are typically cumulative for organisations that are not on the leading edge of capabilities, however, once on the frontier, organisations will have to make trade-offs to alter their competitive position (Amoako-Gyampah & Meredith, 2007; Rosenzweig & Easton, 2010; Schmenner & Swink, 1998). Vastag (2000) provides further extensions to this theory and model by discussing the make-up and composition of the performance frontiers and how they relate to well-known capacity management terms. In contrast to Schmenner and Swink’s (1998) original paper, where within-firm issues were raised, Vastag (2000) extends the coverage of the theory to between-firm issues which he argues are particularly significant in addressing competition among firms with regards to achieving sustained competitive advantage.

Although Schmenner and Swink’s (1998) model provides a rational explanation through the integration of the trade-off and accumulation views, the integrated model has not been fully empirically validated to date. Lapré and Scudder’s (2004) study is one of two studies that has endeavored to empirically test the model, however their study was limited to just cost efficiency and quality capabilities. In addition, the asset frontier was considered as a best-industry measure, with the best performer serving as the benchmark against which all other firms’ performances were evaluated. The potential drawback of defining and measuring the asset frontier in this way is that it is not entirely consistent with the definitions of asset and operating performance provided by Schmenner and Swink (1998) and Boyer and Lewis (2002). Another similar study building on the findings of Lapré and Scudder (2004) is that of Ramdas and Williams (2006). Their study investigated the trade-off between aircraft capacity utilization and on-time performance with the expectation that airlines that are close to their maximum productivity or asset frontiers would face steeper tradeoffs between utilization and performance than those that are further away. The asset frontier was measured in a similar way as Lapré and Scudder (2004).

Even though the two studies have carried out notable work on the integrated model, there still remains a need for greater clarity on whether this model behaves and operates in the way as stated by Schmenner and Swink (1998) and potentially explain what firms do with their core operations capabilities. One of the challenges in trying to validate the integrated model is how best to measure and represent the performance frontiers. Another challenge with the performance frontier concept relates to the level at which it applies. For instance, Porter’s (1996) definition indicates that it is a firm-level measure while Schmenner and Swink (1998) along with Vastag (2000) have implied that it can be applied at the individual capability level. Yet another issue with the performance frontiers pertains to the specific measures that are employed.

Dynamic Capabilities View

Therefore, to address the weaknesses associated with the performance frontier theory based integrated model and to more substantially address the question as to why a firm would trade-off or accumulate capabilities, we propose another explanation. This “new” explanation is
based on the dynamic capability view perspective (Teece et al., 1999). This view evolves from the static-based resource based view which assumes that differences in firm performances are attributed to the differences in resources and capabilities controlled by firms (Amit & Schoemaker, 1993; Barney, 1991; Penrose, 1959; Peteraf, 1993; Zott, 2003). According to Wenerfelt (1984), valuable, rare, inimitable and non-substitutable resources of a firm facilitates successful market entry, determination of profits and competitive advantage. However, resource advantage alone is not considered sufficient and hence the original propositions of the resource based view are seen as static in a highly dynamic business environment (Wang et al., 2007).

The term ‘dynamic’ represents changes in the environment (Teece & Pisano, 1994). Dynamic capabilities are considered as the subset of the capabilities which allow organisations to create new products and processes and respond to the changing market circumstances (Hayes & Pisano, 1994). Collis (1994) states that dynamic capabilities govern the rate of change of ordinary capabilities. Therefore, dynamic capabilities is defined as: “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece, et al., 1997, p. 516).

Dynamic capabilities are an organization’s behavioral orientation that allows them to continuously integrate, renew and recreate their resources and capabilities. More importantly, it means that organisations can improve and reconstruct their core capabilities in response to the changing market conditions or environment in order to attain and sustain competitive advantage (Wang, et al., 2007). Thus, the basic assumption of the dynamic capabilities framework is that today’s fast changing markets or environment forces organisations to be responsive, innovative and to be able to renew capabilities (Ambrosini et al., 2009; Schreyogg & Kliesch-Eberl, 2007).

The dynamic capability view takes a broader perspective and assumes that the actions taken by an organisation is a reflection of the environment. That is, organisations will undertake vigorous scanning of their industry environments and accordingly align and reconfigure their operational capabilities so as to seize opportunities and remain competitive. This invocation of the dynamic capability view is an attempt to better comprehend and investigate the interplay between trade-off and accumulation and more importantly address the broader question as to why a firm would trade-off or accumulate capabilities. A review of extant literature shows numerous studies invoking the dynamic capabilities view (see Anand et al., 2009; Chen & Jaw, 2009; Helfat & Peteraf, 2003; Kyläheiko et al., 2002; Lee & Kelley, 2008; Makadok, 2001; Peteraf & Bergen, 2003; Schreyogg & Kliesch-Eberl, 2007; Witcher et al., 2008; Wu, 2010; Zhou & Li, 2010; Zollo & Winter, 2002; Zott, 2003) however none have directly looked at applying it as an explanation towards firm’s choices of trade-offs and accumulation.

In addition, the dynamic capability view looks at capabilities from both time and change perspectives in an organisation. Market dynamism and firm evolution features make the dynamic capability view adaptable for this study. That is, this study specifically examines operational capabilities over a set period of time (via the generated panel data set) for indications on the development and configuration taking place in the order of trade-offs and
accumulation whilst coping with industry and environment dynamics. Hence, with this “new” explanation based on the dynamic capability view perspective, a firm would choose to trade-off or accumulate capabilities depending on the level of competition that it would face from others in its business environment. But, the impact of competition is not clear in terms of which specific action a firm is likely to take, i.e., it is possible for a firm that faces high levels of competition to trade-off or accumulate capabilities. Therefore, reflecting these twin possibilities, we propose two alternative hypotheses:

Hypothesis 1a: A firm that faces high level of competition would trade-off capabilities; and
Hypothesis 1b: A firm that faces high level of competition would accumulate capabilities.

In order to assess the impact of competition on strategy choice, an objective measure of competition is required. There are many measures of competition such as market share, the concentration index, the Herfindahl index, and the price-cost margin (Shepherd, 1972). In this study, a firm-level rivalry measure proposed by Cool and Dierickx (1993) is used. By using this measure, it is possible to assess the degree to which rivalry from other firms cut into a given firm’s profits by excluding that firm’s own market share from traditional concentration measures. Therefore, this measure of rivalry clearly portrays a firm’s actions and reactions taken based on environmental changes and competition. By incorporating this measure in our study, we have applied the assumptions of the dynamic capability view in a more focused way.

RESEARCH METHODOLOGY

Industry and Firms

The above hypotheses were empirically tested with data from the Australian airline industry. This industry is suitable for this study as consistent data pertaining to the variables of interest to us is accessible from publically available sources such as the airlines and regulatory authorities. Additionally, the strict regulatory regime in which the industry operates requires a high degree of disclosure of operating performance, which improves data credibility. Therefore, we were able to compile longitudinal panel data over the period 2004—2012 from secondary published sources on measures of cost efficiency, quality, delivery and flexibility and rivalry measures on all the major airlines operating in the industry.

Airline Profiles

Australian registered airlines consisting of Qantas, Jetstar, Virgin Australia (formerly known as Virgin Blue), Regional Express (also known as REX), Tiger Airways and Skywest were selected for this study because they collectively hold a high level of market share, covering almost all of the industry. These airlines also make much of the required data publicly available. Therefore, this allowed for the compiling of longitudinal panel data from secondary published sources on all the key variables.
Qantas

Qantas is the world’s second oldest airline, founded in 1920 and is Australia’s largest full service airline carrying over 28 million passengers to destinations in Australia, New Zealand, Asia, North and South America, Africa and Europe. It is a single integrated publically owned airline served by over 27,000 employees. The airline recorded a total revenue of A$11,883 million for the year 2012 with a domestic market share of 36 percent (Qantas, 2012).

Jetstar

Jetstar commenced its operations in 2004 and was established as Qantas Group’s low price airline. It operates at arm’s length from the main full service Qantas airline, maintaining its own operating and marketing systems. It is the world’s largest low cost long haul carrier. In 2012, it carried over 18.7 million passengers to more than 50 destinations in Australia, New Zealand, Asia and the Asia Pacific. The airline earned total revenue of A$3,076 million for the year 2012 and had an employee count of over 4,000. This airline also holds a domestic market share of 23 percent (Qantas, 2012).

Virgin Blue

Virgin Blue is Australia's second-largest airline. It was founded by British businessman Sir Richard Branson's Virgin Group. The airline started in 2000. It is publicly listed, but the majority ownership is held by corporate entities that operate in the transport and logistics industry in Australia. Currently, the airline serves 28 cities in Australia. The airline holds more than 20 percent of the domestic market share in Australia with total annual passenger numbers exceeding 19 million travelers and revenue of A$3,919 million for the 2012 calendar year (VirginBlue, 2012).

Regional Express Airlines (REX)

REX airline commenced in 2002 and is Australia’s largest independent and regional airline outside the Qantas group. The airline has connections to more than 60 regional destinations throughout Tasmania, Victoria, New South Wales and South Australia with a domestic market share of over 3 percent. The airline recorded sales and revenue of A$273 million with over one million passengers for the year 2012 (REX, 2012). It is considered to be a profitable airline within regional Australia.

Tiger Airways

Tiger Airways began its operations in Australia in 2008 as a budget air transport provider. The airline is a partially owned subsidiary of Singapore Airlines. As a recent entrant, the airline has achieved a modest market share of 1.5 percent. The airline recorded sales and revenue of A$221 million for the year 2012 with over a million passengers using its services (Tiger, 2012).
Skywest Airlines

Skywest Airlines was established in Australia in 2002 as a major regional airline in Western Australia and provides services to 16 destinations. The airline provides regular passenger transport as well as charter services. The airline holds a market share of around 1.5 percent and recorded sales and revenue of A$109 million for the year 2012 with over 800,000 passengers (Skywest, 2012).

Data Collection

In this study, all the key variables were estimated with relevant proxy measures. These measures are normally used in the industry and reported in secondary sources. The respective sources for each of the variables used are indicated in the next section. Most of these proxy measures have been mentioned and used in other studies relating to the airline industry (Bennett & Boyer, 1990; Davila & Venkatachalam, 2004; Fethi et al., 2000; Liedtka, 2002; Ramdas & Williams, 2006; Tsaur et al., 2002; Tsikriktsis, 2007). These measures have also been used in studies in the operations strategy area (e.g., Amoako-Gyampah & Boye, 2001; Boyer, 1998; Boyer & Pagell, 2000; Corbett & Campbell-Hunt, 2002; Kathuria, 2000; Koste & Malhotra, 1999; Lapré & Scudder, 2004; Martin-Peña & Díaz-Garrido, 2008; Miller & Roth, 1994; Ramasesh & Jayakumar, 1991).

Variables Analyzed

Cost efficiency

In the airline industry, the conventional measure for unit cost efficiency is cost per available seat kilometers (cents/ASK) (Lapré & Scudder, 2004; Ramdas & Williams, 2006). ASK is a measure of an airline’s capacity and is calculated by the total number of seats available for passengers, multiplied by the number of kilometers flown (Lapré & Scudder, 2004). Both measures are reported in the airlines’ annual reports, and is used in this study.

Quality

Quality as a multidimensional concept and is measured in various ways in the airline industry. For instance, quality can include mishandled baggage, late arrivals, flight cancellations, consumer complaints, customer satisfaction, in-flight service, ticket over-sales, load factor and other similar measures (Ramdas and Williams, 2006, Lapré and Scudder, 2004, Riley, 2003). In this study, flight cancellations were used as a measure of quality. These statistics are recorded by the Australian Bureau of Infrastructure, Transport and Regional Economics (BITRE) and are also noted in company annual reports.

Delivery

For delivery, on-time arrival percentages were deemed an appropriate measure given its widespread use in the airline related literature (Tsikriktsis, 2007). A flight arrival is counted as being “on time” if it arrives at the gate within 15 minutes of the scheduled arrival time.
shown in the carrier’s schedule (BITRE, 2008). The on-time arrival percentages were sourced for the individual airlines from BITRE. This measure was also limited to Australian domestic routes for which the passenger load averaged 8,000 or more passengers per month over the previous six months, and where two or more airlines operated in competition on those routes.

**Flexibility**

Flexibility can be measured in several ways, including inputs (e.g., supplier flexibility), processes (e.g., labor, equipment, materials handling, and routing and expansion flexibility) and outputs (e.g., volume, mix, new product modification flexibility) (Sethi and Sethi, 1990, De Toni and Tonchia, 1998, Cousens et al., 2008). In this study, flexibility was defined at the output level given the stated intention is to measure all the capabilities in their endogenous form. Hence, the flexibility capability was measured as the airline’s ability to provide maximum flight options and involves a combination of volume and mix offered by the airlines. This is measured as the total number of sectors flown on an annual basis and is also reported by BITRE.

**Firm-level Rivalry**

Competition was measured through the level of rivalry faced by the firm. An adjusted Herfindahl index is considered an appropriate measure of rivalry (Cool & Dierickx, 1993; Cool et al., 1994; Durisin & von Krogh, 2005). The measure of rivalry that a firm faces is normally obtained by excluding its own market share from the overall industry Herfindahl index (Shepherd, 1972). This allows the effects of a firm’s own market share to then be separated from the effects of intensity of rivalry from its competitors. Additionally, this would reduce the interdependence between market power and rivalry variables (Cool et al., 1999). Therefore, for this study, for each year, the adjusted Herfindahl index was calculated for each of the airline in the industry by excluding the focal company’s own market share. In the Australian airline industry, market share is determined through the number of passengers carried by the respective airlines (BITRE, 2008) and has been reported in airline related literature (Szymanski et al., 1993). The number of passengers carried is usually reported by airlines in their annual reports and can also be found in various investor related presentations and briefings. For this study, market share data upon which the adjusted Herfindahl index is based was obtained from various sources mentioned above.

**RESULTS AND ANALYSIS**

**Descriptive Statistics**

Descriptive statistics for the four capability measures along with the rivalry measure are presented in Table 1 for the all the airlines included in this study.
Why do firms trade-off or accumulate operations capabilities?

It can be observed from the statistics that the average cost efficiency was not too different among the larger carriers Qantas, Virgin Blue, Jetstar and Tiger as well as smaller regional carriers like Regional Express and Skywest. In terms of ensuring quality, all airlines maintained low flight cancellations on average. Average delivery (on-time arrivals) percentages were generally above eighty for all airlines except for recent entrant Tiger airlines and Qantas dominated in the flexibility capability (sectors flown). The rivalry index statistics suggests that this industry has moderate to high concentration of players.

### Hypotheses Testing

In order to test the hypotheses presented earlier, a logistic regression model was developed. Using a methodology similar to Lapré and Scudder (2004), a direct logistic regression model was estimated to assess the impact level of rivalry faced on the likelihood of trade-offs and accumulation occurring. Just like multiple regression, this technique can use one or more independent variables to predict a single dependent variable. The important distinguishable feature is that the dependent variable is non-metric, which is suitable for this study. That is, in this study, the likelihood of trade-offs or accumulation occurring based on level of rivalry faced was examined. To test our twin hypotheses, high levels of competition would result in either firms trading-off or accumulating their operational capabilities. Therefore, the logistic model used to test the twin hypotheses contained one independent variable (Rivalry) and one dependent variable (Trade-off/accumulation).
dependent variable (Strategic Choice, which was coded as Trade-off = 1 and Accumulation = 0).

**Dependent Variable**

In order to conduct the logistic regression analysis, it was necessary to determine the strategic choice of each airline for each year under study in order to code the binary dependent variable appropriately. We extended and improved Lapre and Scudder’s (2004) approach. A two step process was used.

In the first step, we applied statistical process control logic to determine if the deviation for a capability measure was within plus or minus one standard deviation of the mean for each airline. If the deviation was within plus or minus one standard deviation, then the performance was deemed to be “average”. If the deviation was outside these threshold limits, then depending on the nature of the capability measure, the performance was declared to be “high” or “low”. For example, for a measure such as unit cost (C/ASK), if the value in one year was above the plus one standard deviation, it was considered as low performance since this outcome was an increase in cost performance. However, for a measure such as delivery (measured as on-time delivery), if the value in any given year is above one standard deviation, than this was declared to be high performance since this measure of performance was on a positive scale. Using this approach, for each year, a declaration was made as to whether each airline was performing at a high, average or low level for each of the four capabilities.

In the second step, the outcomes of the first step, where each capability was analyzed separately, needed to be consolidated into summative judgments on the type of strategy choices that firms were making every year. This was done by counting the number of instances of highs, averages and lows that airlines had for each year. A set of heuristics were then applied to declare if an airline was engaging in trade-off or cumulative behavior. Specifically, an airline was declared to be engaging in cumulative capabilities strategy if it had any one of the following combinations in any given year: (1) four highs; (2) four averages; (3) three highs and one low or one average; (4) three averages and one low. Trade-off, on the other hand, was declared if the combination of capabilities was of the following types: (1) one high and any combination of averages and lows; (2) two averages and two lows or two highs; (3) three averages and one high. This classification of each airline in each year resulted in 31 instances of trade-off and 18 instances of cumulative capabilities strategy choices. Similar to Lapre and Scudder’s (2004), we used this year-airline data to perform the logistic regression analysis. Our total number of records for analysis was 49.

**Independent Variable**

As stated previously, our logistic regression model had one independent variable, rivalry (RIV) faced by the airline, with this measure representing competition. In order to obtain a measure of firm-level rivalry, the following computations were made:

- Market share: \( MS_{i,t} = \frac{\text{Total passengers carried}_i}{\text{Total passengers carried by all airlines in year}_t} \);
- Herfindahl Index Industry: \( \text{HI Ind}_t = \text{Sum of all airlines } MS_{i,t}^2 \); and,
- Rivalry: \( \text{RIV}_{i,t} = \text{HI Ind}_t - MS_{i,t}^2 \) (where; \( i = \text{airline and } t = \text{year} \))
Results of Logistics Regression

To predict the probability of trade-offs and accumulation occurring as a result of the RIV measure, we looked at the outputs obtained from the logistic regression model using recommendations specified by Hair et al. (2006). Table 2 provides the logistic regression analysis results.

Table 2 Logistic regression results for airline industry

<table>
<thead>
<tr>
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<th>Value</th>
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<tbody>
<tr>
<td>Constant (α)</td>
<td>-0.612[0.619]</td>
</tr>
<tr>
<td>Rivalry Index (β)</td>
<td>4.953(0.054) [2.575]</td>
</tr>
<tr>
<td>Model X²</td>
<td>4.030 (0.045)</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>61.408</td>
</tr>
<tr>
<td>Number of observations</td>
<td>49</td>
</tr>
</tbody>
</table>

Standard errors in parentheses. *p<0.10

The results of the logistic regression analysis (Table 2) offer information on the significance for probability of capabilities deployed as a result of the rivalry index measure. From Table 2, our model was supported with a chi-square value of 4.030, p= 0.045. The estimate for β, the coefficient for the rivalry index is positive and significant 4.953, p=0.054. Thus the logistic regression analysis showed that, competition based explanation measured through the rivalry index was supported (although this support was not very strong at p-value of less than 0.10). Furthermore, in terms of the twin hypotheses proposed, the analysis showed that high levels of competition is associated with trade-off and low levels of competition is associated with cumulative capabilities focus., therefore, H1a is supported and H1b is rejected.

DISCUSSION AND IMPLICATIONS

The results of this study provide useful insights into the likelihood of firms engaging in trade-offs and accumulation of capabilities based impact of competition. The results demonstrate that strategy choice is significantly affected by the level of rivalry faced. The results suggest that competition (firm-rivalry) is a realistic measure for understanding strategy choices that firms make. The rivalry measure in this case is a useful measure for firms to grasp the dynamic conditions that exist and has been demonstrated to be a substantially valuable measure to inform strategy choice. This movement and choice can perhaps be explained by the intensity of competition faced by players as measured through the rivalry measure.

From a theoretical perspective, this study applied the dynamic capabilities view as a new explanation for the reasons as to how organisations deploy the various capabilities as a response to the changing conditions in the business environment. The dynamic capabilities view is therefore a useful lens for this study. For instance, this theory assumes that capabilities are likely to be developed and reconfigured and this is accentuated over time. This suggested development and reconfiguration of capabilities was observed and justified with the use of the inter-firm rivalry index. This allowed the study to specifically take a focused view and direction. The dynamic capability view clarifies the reasons for capabilities being modified under general market conditions whilst the demonstration of performance
frontiers carefully projects the likely scenarios when a specific behavior may be needed or would prevail. This provides a more comprehensive understanding of the dynamics surrounding organisations and also implies that there is a lot more to predicting organizational performance than those currently suggested.

This study attempted an empirical validation using the dynamic capability view explanation. By including the firm-level rivalry measure, we have advanced the argument in considering the environmental dynamics or levels of competition faced as a significant predictor of strategy choice. The dynamic capabilities view emphasises on reconfiguration and rearrangement of capabilities as the basis on which firms respond to changing market conditions. Our results show that in a moderate to high concentrated market, airline firms do tend to assume some form of rearrangement and reconfiguration. In this case, the intensity of competition necessitated that strategic decisions be made and a small mix of capabilities yet critical be prioritised at that point in time. It therefore can be assumed that industry concentration and rivalry do influence competition and therefore may prove useful for understanding capability development, deployment and preference in a dynamic business environment. The result of this study showed that strong competition was associated with trade-off behaviors whilst weak competition indicated an opportune time for capability accumulation. From a methodological perspective, this study design has responded to several calls made by researchers for empirical studies to address populations (as opposed to samples), use longitudinal (instead of cross-sectional) data and to use real objective measures (in place of perceptual survey data) (Avella, et al., 2011). This study incorporated these suggested methodological features, and as a result, provides rich insights into the issues from a different perspective.

Given our empirical approach and subsequent findings, this study could directly benefit service and manufacturing type organisations in the configuration and investment of operations capabilities and in understanding their usefulness in influencing overall organizational performance. These findings provide guidance to managers in terms of the factors to consider when deciding what and how to deal with the key operations capabilities of cost efficiency, quality, delivery and flexibility. Our study suggests that competition is a stronger driver for the choice of competing on few or multiple capabilities. In terms of theory, this study suggests that the extent of competition that a firm faces, based on the dynamic capabilities view perspective, is a better explanation for a firm’s decision. This paper therefore provides a new perspective and better explanation as to why firms trade-off or accumulate capabilities and in doing so, we have contributed to an important debate in the operations strategy area.

LIMITATION AND FURTHER RESEARCH

This study has certain limitations relating to the measures used and data that were collected, which provides an opportunity for future researchers to address. For instance, this study used single measures instead of multiple measures for each of the operations capabilities. Although the proxy measures used were guided by literature, their use and representation could be questionable. In this study, quality was measured as flight cancellations. However, other studies (e.g., Rhoades et al. (1998)) state that on-time arrivals performance (which in this study was used as a proxy for delivery) can also proxy for the service aspects of quality.
measure. For flexibility, this study reported the actual outcomes in terms of the volume and mix of services offered by the airlines. An ideal measure of flexibility would have been to measure changes or responsiveness (e.g., rate of change in sectors scheduled and flown or city pairs developed). However, this would have required more concise data (retrieved from weekly and monthly records). The changes would also be subject to various internal and external factors which may require data adjustments for a more realistic picture.

We investigated the research question using the suggestions of previous authors and made advancements by incorporating the firm-level rivalry measure to reflect the changes taking place in the environment. Despite our success in investigating this research question in an improved manner, there is more that can be done by future researchers for a more rigorous study. Future researchers can attempt to minimize above mentioned issues by using a range of actual and perceptual measures with the adoption of a rigorous methodology in further testing the research question with the two theories. Other measures of competition can also be explored. Future studies could also expand to other industry sectors where players have less regulatory restraints and have much greater latitude in terms of competitive actions that they take. This would provide further insights into the value and applicability of the integrated model as well the dynamic capabilities explanation in this changing environment. Continued use of longitudinal studies will also allow for the capture of these dynamics, an aspect that is vital as firms search for newer sources of competitive advantage.

REFERENCES


Why do firms trade-off or accumulate operations capabilities?


REX. (2012). Annual Report


