HOSPITAL FOCUS: AN EXAMINATION OF ITS ANTECEDENTS, COMPLEMENTARITIES, SYNERGIES, AND EFFECTS ON TRIPLE AIM HOSPITAL PERFORMANCE OUTCOMES

By

Matthew J. Castel

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Business Administration – Operations and Sourcing Management – Doctor of Philosophy

2016

ABSTRACT

HOSPITAL FOCUS: AN EXAMINATION OF ITS ANTECEDENTS, COMPLEMENTARITIES, SYNERGIES, AND EFFECTS ON TRIPLE AIM HOSPITAL PERFORMANCE OUTCOMES

By

Matthew J. Castel

Within the last few years, healthcare has become a highly desirable research arena in the operations management literature. Given the high level of quality required, uncertainty in service demand, and cost reduction needs; operations management research is well suited to assist in improving the U.S. healthcare system. With the introduction of the Affordable Care and Patient Protection Acts in 2010, the metrics by which hospitals are measured are now being rooted in the concepts of the Triple Aim – improved experience of care, improved population(s) health, and reduction in per capita cost. While a hospital may strategically concentrate on one or two dimensions of the Triple Aim, the achievement of all three is difficult. This dissertation attempts to explore how the concept of focus can potentially aid hospitals in achieving Triple Aim goals. Originally rooted in the concept of the "focused factory," the concept of focus has been touted by scholars and practitioners alike for its ability to enable the firm to reduce complexity in its operations and improve upon the quality of outcomes and efficiencies – such as economies of scale. Recently, scholars have begun to study the effects of hospital focus on performance outcomes. However, there is still a poor understanding of what influences a firm to undertake a focus strategy and how a focus strategy, along with complementarities and synergies (such as integration and breadth of services), might be able to meet the needs of the Triple Aim. This dissertation will examine in depth the focus strategy by exploring potential environmental

antecedents; and by looking at how focus with expanded service offerings and integration influence the ability of the firm to balancing the requirements of the Triple Aim.

I dedicate this dissertation to my wife **Caroline Castel**. Without your support, this would not have happened. Your willingness to put up with my never-ending studies is appreciated.

ACKNOWLEDGEMENTS

I would like to thank all of my committee members, Dr. Shawnee Vickery (committee co-chair), Dr. Sriram Narayanan (committee co-chair), Dr. Anand Nair, and Dr. Michael McLeod. Their guidance, comments, and suggestions were inimitable in the development of my research and the development of this dissertation.

The study examined antecedents and effects of hospital focus using discharge data from the Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

This dissertation examines antecedents of hospital focus using available data from the Healthcare Information and Management Systems Society (HIMSS) database.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

KEY TO ABBREVIATIONS

AHA	American Hospital Association
DSJ	Decision Sciences Journal
HHI	Herfindahl-Hirschman Index
IJPR	International Journal of Production Research
JOM	Journal of Operations Management
JSCM	Journal of Supply Chain Management
MS	Management Science (Journal)
NIS	National Inpatient Sample
POMS	Production and Operations Management (Journal)

INTRODUCTION

Within the past few years rising health care costs have been a concern for the United States. In 2012, nearly $3 trillion was spent on U.S. health care (Benton, 2013) and it is expected that costs will increase from 18% of the gross domestic product (in 2011) to 20% gross domestic product by 2020 (Berwick & Hackbarth, 2012). When compounded by the fact U.S hospitals also saw expenses outpace revenue growth in 2013 (Kutscher, 2014) and strong industry pressure to control costs while increasing quality of service (Boyer & Pronovost, 2010; Douglas & Ryman, 2003), the U.S. healthcare system has become of particular research interest to operations and strategy scholars.

In the healthcare domain, while various management and operations based concepts [e.g. organizational behavior, IT, experience, workload, structure/infrastructure, etc.] have been utilized for exploring the effects on performance outcomes, one strategy – a focus strategy – has been presented as a potential means of reducing costs and improving operational performance by reducing and specializing in a key set of services either to improve differentiation from the competition or to reducing the cost of service. The operations literature has examined various performance dimensions including cost reduction/performance (e.g. Andritsos & Tang, 2014; Butler et al., 1996; Ding, 2014; Li et al., 2002; McDermott & Stock, 2011), outcome quality and error reduction (e.g. Boyer et al., 2012; Butler et al., 1996; Chesteen et al., 2005; Goldstein & Naor, 2005; KC & Terwiesch, 2011; Stock et al., 2007), and utilization/productivity (e.g. Angst et al., 2011; Bhargava & Mishra, 2014; Ferrand et al., 2014; White et al., 2011). While originally rooted in the production of goods (Porter, 1985; Skinner, 1974), the focus strategy has been noted and shown to have similar impacts in the service industry (McLaughlin et al., 1995), and in particular, in the delivery of health care in a hospital setting (Chesteen et al., 2005; Clark &

Huckman, 2012; Ding, 2014, 2015; Hyer et al., 2009; KC & Terwiesch, 2011; McDermott & Stock, 2011).

Under the old paradigm of fee-for-service, hospitals received payment for the services rendered to patients. This made the focus strategy particularly ideal for its ability to reduce costs and increase efficiency. The greatest representative example in a hospital setting is the Shouldice Hospital case presented by Heskett (1983) that showed that through improved performance on a single type of surgery – external hernia replacement – a hospital could achieve higher levels of performance than their competitors. However, recently with health (medical care) insurers, Medicare, and Medicaid moving toward episode-based bundled payments, the cost effectiveness created from a focus strategy is threatened. In particular, with the passage of the Affordable Care and Patient Protection Acts, the concept of Triple Aim performance (Berwick et al., 2008) was passed inclusively within the law influencing the expectations of United States' hospital outcomes (Coyne et al., 2014). The Triple Aim stresses the importance of improving the experience of care (both clinical and service), improving the health of populations (e.g. reducing admissions), and reducing per capita health care costs (Berwick et al., 2008). This changes the emphasis from exclusively from cost and quality of care to striking a balance between, and improving the (1) experience of care, (2) improving the population health, and (3) reducing per capital costs.

The purpose of this dissertation is to take a deeper dive into focus as a strategy in the hospital environment and to incorporate an understanding of how it may impact a hospital's ability to meet the triple aim. To do this, hospital focus will be assessed in three parts: (1) What are potential antecedents to hospital focus? (2) What are the effects of focus on triple aim performance outcomes? and (3) Does integration provide a means of expanding the service offerings of a

hospital that utilizes a focus strategy to ultimately aid in improving triple aim performance outcomes?

CHAPTER 1 – Literature Review

1.1 Literature Review

1.1.1 The Quest for Improving Disparate Forms of Performance

In all industries, inclusive of service and production-based firms, it has been recognized that there is a need to measure performance on multiple dimensions. While a firm requires a healthy profit margin to sustain operations to enable firm growth, the literature has recognized that revenue/profit alone is not enough for a firm to be successful. Even when considering the simple concept of manufacturing performance, the operations literature has identified that excellence in flexibility, cost, delivery, and quality (Jayaram et al., 1999; Vickery et al., 1997) are quintessential for a factory to be successful. In a similar fashion, in order for a firm to be successful, it is important to understand that revenue alone is not enough and additional frameworks must be used for assessing the success of a firm.

Performance frameworks famous in the operations management literature for assessing firm performance include the Balanced Scorecard (R. S. Kaplan & Norton, 1992, 1996, 2007) and the Triple Bottom Line (Elkington, 1997, 1999). Both performance frameworks recognize that internal processes and external social concerns influence the overall success of a firm. To that extent, a similar realization has come about in the hospital industry with the advent of the Triple Aim (Berwick, 2003) framework. The Triple Aim recognizes that hospital performance needs to have healthy operating margins, typically achieved through the reduction of costs; however, it expresses that cost reductions must be balanced with the quality of patient care delivery and the ability of the hospital to address the needs of the patient populations that it serves (Berwick, 2003). The recent implementation of the Patient Protection and Affordable Care Act ("Patient protection and affordable care act," 2010), commonly referred to as the ACA, attempts to strike a balance

between these three dimensions in its multi-year rollout for Medicare (CMS) payments while gradually implementing elements of the Triple Aim (Raso, 2015).

So what is the Triple Aim? As mentioned previously, the Triple Aim is a framework for assessing performance of healthcare institutions that is rooted in the understanding that there is a balance between the 1) per capita cost of care, 2) the experience of care – both the patient experience and the clinical process of care, and 3) improving population health (Berwick et al., 2008; Raso, 2015; Stiefel & Nolan, 2012) – see Figure 1. Each dimension of the Triple Aim is described below:

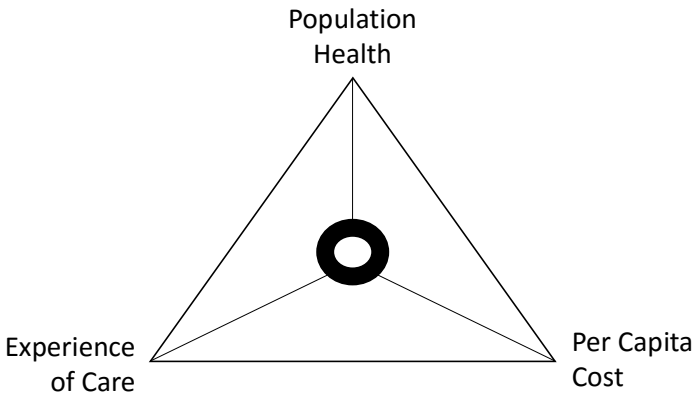


Figure 1: Triple Aim as depicted by IHI[1]

1. *Per Capita Cost* reduction is meant to reduce the overall cost of care for every patient. This requires payers and hospitals to understand that there are a mix of conditions and market/patient circumstances associated with the treatment provided;
2. *Experience of Care* is the systematic evaluation of the quality of clinical outcomes and the patient care experience; and

[1]Recreated diagram as depicted in Stiefel and Nolan (2012)

3. *Population Health* is the ability to improve the population health – understanding that "population" could be geographical, but could also be members of other population groups, such as a health cooperative or comorbidity group (Berwick et al., 2008).

With the Triple Aim leading reforms in how health care is provided (Raso, 2015), and in particular the reimbursement of services, the Triple Aim framework is a performance framework that will become increasingly critical in the future of health care, and is thus deserving of additional study.

1.1.2 The Focus Strategy & the Triple Aim

The concept of focus in operations is related to the notion of the focused factory introduced by Skinner (1974). The focused factory embodies the idea that concentration on a single product, process, or market segment enables a firm to increase their efficiency and effectiveness, leading to a competitive advantage in the marketplace. This advantaged was a result of the focused factory concentrating on a narrow product mix for a particular market niche or product line, aligning "equipment, supporting systems, and procedures… concentrate(d) on a limited task for one set of customers" (Skinner, 1974, p. 114). By limiting their production mix, focus allows the factory to achieve greater returns and efficiencies than the unfocused firm. This was a consequence of the focused factory having a limited set of objectives creating the inherent ability to "out produce, under sell, and quickly gain competitive advantage over the complex factory," (Skinner, 1974, p. 116). By limiting its scope to a specific market, product, process (Ketokivi & Jokinen, 2006; Skinner, 1974), focus allows for an improved understanding of the production processes and tasks enabling the manufacturing firm achieving "sustainable cost leadership (cost focus) or differentiation (differentiation focus) in its target segment" (Porter, 1985, p. 16).

The concepts and benefits of the focused factory have similarly been assessed within service industries as well as manufacturing (Heskett, 1986). In general the focused firm through the differentiation and selection of market segments adjusts the process and infrastructure of its service delivery system to meet the needs of the specific segments selected by the firm (McLaughlin et al., 1995, p. 1118). As noted by McLaughlin et al. (1995) the benefits of service focus can be similar to that of a focused factory; however, service focus has the potential disadvantage of losing economies of scale or scope through the limited breadth of horizontal services offered. In the case of hospitals, this does not mean that a focused hospital is epitomized by the creation of a specialty center (e.g. cardiac, cancer treatment, etc.), but rather that the configuration of the other services offered within the hospital will align to assist with the focal domain(s) (McDermott & Stock, 2011; McLaughlin et al., 1995). Much of this is the result of services being more complex than the production of most products. This results from patients not being homogeneous in the services expected/needed. Each service rendered tends to require a high level of personalization and customization requiring many services to be rendered when requested (Voss & Hsuan, 2009)

An examination of operations management healthcare research shows that the extant literature on focus is limited even though its importance is recognized (KC & Terwiesch, 2011; McLaughlin et al., 1995). In recent years, several researchers have explored focus in terms of clinical specialties & services (e.g. Andritsos & Tang, 2014; Ding, 2014; KC & Terwiesch, 2011), patient focus (e.g. Chesteen et al., 2005) and a few have explored focus in terms of patient safety (e.g. Ferrand et al., 2014). These scholars have identified several gaps in the literature, in particular, McDermott and Stock (2011) called for further study of the antecedents of focus and the ability to understand how organizations can change their level of focus.

While a focus strategy has proven successful in reducing costs and improving performance for the subset of services that the hospital specializes in, some authors note that the rationale of why some firms focus is not well understood (Ketokivi & Jokinen, 2006; McDermott & Stock, 2011). This brings about the first research question explored by this dissertation: (R1) What antecedents influence the potential for a hospital to focus?

The focus strategy lends itself to two major outcomes (1) cost reduction and/or (2) market differentiation (Hayes et al., 2005). In cases of both case, a reduction of products or services result; however through the reduction of services the focal population needs are met, but a gap is created when the firm attempts to meet the needs of the overarching population. It has been noted that performance via a focus strategy is not guaranteed and that a broader product lines can result in similar levels of performance (Ketokivi & Jokinen, 2006). In this regards, it was noted by Kekre and Srinivasan (1990) that the negative effects of product line expansion (i.e. breadth of products) tend to be countermanded by higher levels of profitability obtained through increased market share. In the context of a Triple Aim framework, it is uncertain whether focus can provide the breadth of services required to meet the population needs for a given hospital. Hence it becomes an interesting paradox to be assessed with respect to the focus and breadth of services provided by the hospital; leading to the following research questions: (R2) what effects does hospital focus have in a Triple Aim framework? And (R3) what effects does breadth of services have in a Triple Aim framework?

To this end, the interesting nature of service breadth requirements also leads to the question of how a focused hospital can bridge the gaps required in the providing of services. Can strategic collaboration in the value chain provide the complementary services and outcomes necessary for the hospital to focus its services; and can the strategic collaboration with other hospitals assist in

bridging the gap? This brings about the final research question posed within this dissertation: (R4) does the complementary strategy of integration explicitly impact the key performance outcomes within the Triple Aim framework?

This dissertation will address these research questions in three studies. The first study will examine the environmental antecedents of a focus strategy while simultaneously assessing secondary data measurement of the hospital focus variable. The second study will expand upon this work by evaluating the implications of a focus strategy on measures based in the Triple Aim framework while utilizing a resources based view (RBV) theoretical lens. This second study will also evaluate the potential synergistic effects created from breadth of services offered within the hospital on the measures. Finally, the third essay will assess hospital focus and the potential complementary benefits of integration across operational units and hospitals on a Triple Aim performance.

1.2 How to Measure Focus

1.2.1 The Multiple Levels of Focus

From a hospital structure standpoint, the International Classification of Diseases, ninth revision (ICD-9-CM) attempts to classify patient conditions into a broad category of Major Diagnosis Categories (MDCs) and then into lower level Diagnosis Related Groups (DRGs). MDCs tend to align with the "function of the organ system it predominantly affects or the specialist who typically would provide care," (Fetter & Freeman, 1986, p. 44) – e.g. cardiac care, respiratory care, etc. These MDCs tend to have both medical and surgical components, with the DRG reflecting its respective categorization. The DRGs identify the "product" (i.e. service) that the hospital is providing the customer (Fetter, 1991) along with characteristics associated to the patient under that

DRG such as the severity of the illness (SOI) and the risk of mortality (ROM) included – e.g. DRG338 is Appendectomy with complicated principal diagnosis with major complication or comorbidity. The DRG is assigned to a patient to indicate the primary condition and is classified under the MDC it is associated with (See Figure 2).

There are three potential levels that focus can be measured at: (1) the hospital level, (2) the operating unit level, and (3) the process level (KC & Terwiesch, 2011). At the *process level,* focus is evaluated as the type of treatment (i.e. process) is followed for a given patient diagnosis; for example, KC and Terwiesch (2011) looked at how patients in need of cardiac revascularization underwent cardiovascular artery grafting. At this lowest level, focus is in terms of a specific treatment (i.e. DRG) picked from a set of treatments (i.e. DRG). At the *operating unit level*, focus is the extent to which a specific treatment (i.e. DRG) is utilized compared to other treatments within a given operating unit (i.e. MDC); for example extent of cardiac revascularization patients compared to all cardiac patients. The final level of focus, *hospital level*, evaluates either the specialization of treatment(s) [i.e. DRG(s)] or operating unit(s) specialization [i.e. MDC(s)] compared to other treatments or operating units, respectively. At the hospital level and example could be either the extent the hospital specializes in cardiac revascularization patients (i.e. DRG) or the extent the hospital specializes in cardiac care (i.e. MDC).

A majority of the hospital focus literature is concerned with a single MDC and exists within the operating unit level. Authors KC and Terwiesch (2011), McDermott and Stock (2011), Clark and Huckman (2012), Andritsos and Tang (2014), and Ding (2015) evaluated the degree of focus within the cardiac care. This emphasis on cardiac care, while extremely valuable, limits the generalizability of the focus studies given there is the potential for hospitals to focus on different

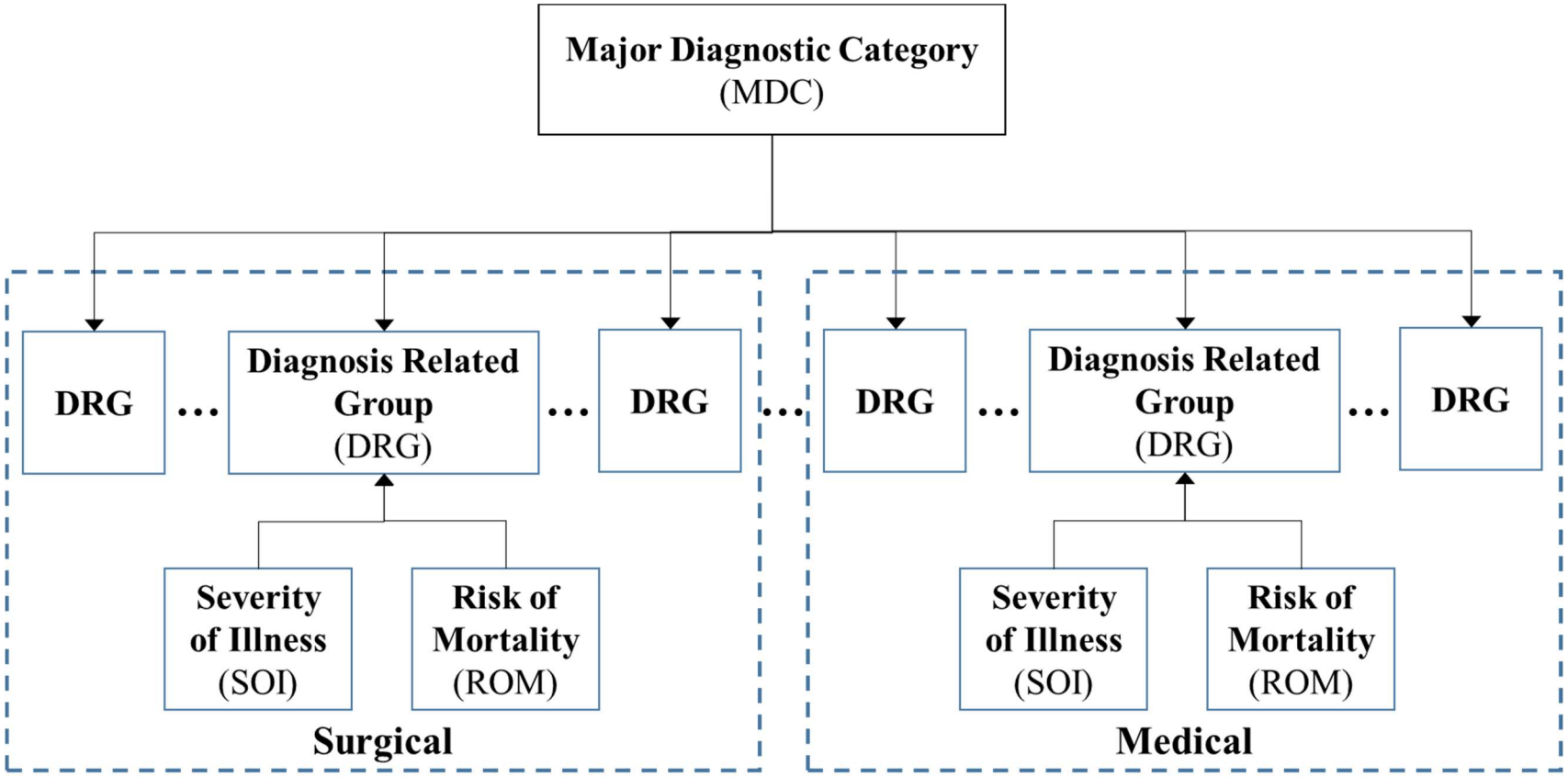


Figure 2: International Classification of Diseases (IDC) - Version 9 - Clinical Modification[2]

[2] Adopted from http://www.vanosta.be/hefibe.htm and validated by the description in Averill et al. (2003).

MDCs. The work performed by KC and Terwiesch (2011), which evaluated the impacts of cardiac focus, showed that the advantages tend to diminish as cardiac focus is measured at the firm level.

While within operating unit evaluation of focus is important, there is a lack of understanding of the firm level impact. KC and Terwiesch (2011) evaluated the extent of cardiac focus (MDC) on performance, but was limited since hospitals could focus outside of just cardiac care. Recognizing the extant literature was working within a single MDC, Ding (2014) expanded the hospital focus literature to look across the MDCs. With a concentration of extant hospital focus studies within the cardiac MDC and existing below the hospital level, there presents an opportunity for further research.

1.2.2 The Past Measurement of Hospital Focus

The measurement of focus in a service environment is difficult to conceptualize. Focus in a factory setting can rely on viewing the number of products the factory is producing, and similarly evaluate the variant designs to determine the market categories being met. Fewer product lines, smaller plants, or assembly processes (e.g. batch vs. continuous process) can directly assist in understanding the degree to which a factory is focused (Pesch et al.). However, products tend to be homogenous in their production from one unit to the next. In a service environment, each customer has their own service needs, and in a hospital environment these service needs tend to be even more heterogenous between patients. While a hospital can focus on a specific operational unit (e.g. cardiac care, obstetrics, etc.) there are different diagnosis for each patient admitted in the hospital with a variety of comorbidities and potential secondary conditions. This means measuring at the operational unit – MDC – level may not provide the same level of clarity as measuring at the process – DRG – level. To that extent, this section and the next will discuss the measures used to date, and potential measures to look at moving forward.

The measurement of focus has been assessed in both primary and secondary data analyses. Within primary data collection latent variable scales have often been created, the most notable by Skaggs and Huffman (2003). However, up to this point in there has been no operationalization of a perceptual measure for focus in a hospital setting. The third study of this dissertation will address this by adapting the service focus scale developed by Skaggs and Huffman (2003).

The secondary data measurement of focus has largely relied on understanding the proportional level of a specific condition or service related to the total. With the exception of Ding (2014) and to some extent Andritsos and Tang (2014), both utilizied a concentration index – the Herfindahl-Hirschman Index (HHI), most of the articles tend to measure focus at the operational unit or procedural level, and in a majority of those cases the focus measure is within a cardiac environment (See Table 1). KC and Terwiesch (2011) attempted to expand the proportional measure of cardiac care up to the hospital level; however they saw limited results of hospital-level focus for cardiac care hospitals on their measured performance indices (See Table 1). Ding (2014) was the first author to challenge the measurement of focus as a proportion, by recognizing that hospitals could have one or more areas of focus. He utilized the Herfindahl-Herschman index (HHI) to identify concentration of specialties within a given hospital based upon patient day. Given the different measures (proportion, max proportion, HHI) and the different units (e.g. patient hours, number of patients, etc.) of measurement, a further dive into the measurement of the focus construct is necessary.

1.2.3 Understanding and Applying the Ecological Roots of Measuring Focus

When measuring focus, many authors have utilized proportions and HHI as a means of quantifying the degree that hospitals focus as an overarching strategy, a departmental specialty, or a procedural specialty. Most of these measures are rooted in ecology's attempts to understand the diversity of

Table 1: Key hospital focus related articles in the operations management literature

Author(s)	Journal	Measure Description	Measure Type	Explanation
Hyer et al. (2009)	JOM	Trauma Unit Focus	Experiment Treatment	The creation of a trauma unit was utilized as a pseudo-experiment treatment.
KC and Terwiesch (2011)	MS	Cardiac Hospital Focus	Proportion	Cardiac patients divided by total number of admissions
		Revascularization Focus	Proportion	Revascularization patients divided by the total number of cardiac patients
		CABG Focus	Proportion	Cardiovascular artery grafting (CABG) patients divided by the total number of revascularization patients
McDermott and Stock (2011)	JOM	Cardiac Case Focus	Proportion	Binary representation of cardiac focus as determined by the number of cardiac cases compared to the number of cases presented in the hospital
		Cardiac Days Focus	Proportion	Cardiac patient days divided by total number of hospital patient days
		Cardiac Bed Focus	Proportion	Number of beds license for cardiac care divided by total number beds in the hospital
Clark and Huckman (2012)	MS	Cardiac Focus	Proportion	Number of cardiovascular patients divided by the total number of patients

Table 1 (cont'd)

Author(s)	Journal	Measure Description	Measure Type	Explanation
Andritsos and Tang (2014)	POMS	Cardiac Focus	Concentration	Herfindahl-Hirschman index (HHI) which evaluated the concentration of cardiac patient type
		Cardiac Focus	Max Proportion	Max proportion of patients divided by total cardiac patients for a given clinical classification system (CCS)
Ding (2014)	JOM	Hospital Focus	Concentration	Hefindahl-Hirschman index (HHI) which sums the squares of the proportion of patient days for a given area to the total number of patient days
Ding (2015)	JOM	Cardiac Hospital Focus	Proportion	Number of cardiac procedures divided by all hospital procedures
		Heart Attack Focus	Proportion	Number of heart attack procedures divided by all cardiac procedures

populations. Within the focus literature, we attempt to look at diversity's inverse – concentration – as measure for a firm's focus. However, even the ability to measure diversity remains problematic given that no single measurement of diversity can sufficiently encapsulate the idea (Morris et al., 2014). In attempts to measure diversity, there are three major categories of measurement: richness, evenness, and proportional diversity (Stirling et al., 2001). For their formulations please see Table 2.

Richness (S) is currently the prevalent measure of diversity in the ecology literature (Stirling et al., 2001). Richness assesses the number of categories – typically species – which exist within a given environment. An analogous measurement for richness in the business literature would be the breadth of services; such as the number of services (e.g. DRGs) or number of service categories (MDCs). If a firm were to have few services, it would have a low level of richness; and if it were to have hundreds of services, it would have a high level of richness. Typically richness is measured by adding the number of species, and in the case of a business environment, it would be the number of services or service categories. The negative of richness would be consistent with the original definition of focus proposed by Skinner (1974) and Porter (1980).

In addition to richness is the idea of species abundance which reflects the evenness or equitability across species (Stirling et al., 2001). Restated, evenness is "the degree to which individuals are split among species with low values indicating that one or a few species dominate, and high values indicating that relatively equal numbers of individuals belong to each species," (Morris et al., 2014, p. 3515). In the context of a business, this would reflect usage or investment within the business being equal across business services or service categories. In observing the concept of focus in the service environment, this concept fits well with concept of service focus

presented by McLaughlin et al. (1995); whereby the firm will not necessarily reduce the services provided, but rather focus on a specific set of services.

Table 2: Common measures of diversity

Measure	Formula
Richness	S = number of item categories
Pielou's Evenness Index	$J' = \frac{H'}{H_{max}} = \frac{\sum(p_i * \ln p_i)}{\ln S}$ $H' = \sum(p_i * \ln(p_i))$ $H_{max} = \ln S$
Simpson's Index of Diversity[3]	$1 - \lambda = 1 - \sum\left(\frac{n_i}{N}\right)^2 = 1 - \sum(p_i^2)$ n_i = number of items n, within a category i. N = the population p_i = the proportion of n to N
Berger-Parker Dominance	p_{max} = maximum proportion by category

The proportional diversity indices attempt to account for both species richness and evenness in their calculation of diversity (Stirling et al., 2001). The most common of the proportional diversity measures are Shannon's diversity index (H') and Simpson's Diversity index (D_1) (Morris et al., 2014). When looking at concentration – the measure typically used for focus – these diversity measures are typically either multiplied by a negative one, or subtracted from one to indicate the degree of focus. The Herfindahl-Hirschman index (λ), a measure of concentration, is closely related to Simposn's diversity index: the Herfindahl-Hirshman index (HHI) is equivalent to one minus the Simpson's measure of diversity ($\lambda = 1 - D_1$). Dominance measures such as the Berger-Parker dominance (p_{max}) can also be utilized to determine concentration levels by

[3] Note, λ is Simpson's index of concentration (Routledge, 1980), which is more commonly known in the business literature as the Herfindahl-Hirschman index (HHI).

evaluating the maximum proportion in a given category (i.e. species or service). However, while the various measures of focus tend to strongly correlated, they are context specific and not interchangeable; leading to debate over the appropriateness based upon the context to which they are applied (Morris et al., 2014).

While evenness tends to lend itself better to the definition of service focus, the primary measures utilized in the hospital focus literature have been of focus using secondary data. This dissertation will examine different measures of focus using secondary data to see if there is coherence in these measures, and attempt to determine their appropriateness in the measuring of hospital focus.

1.3 Relevant Theoretical Frameworks

1.3.1 Resource Based View of the Firm

A study of a firm's resources and capabilities, in their broadest sense, can provide insight into the ability of the firm to compete in industry (Penrose, 1959). The resource-based view (RBV) identifies that a firm's competitive advantage comes through its ability to gain rents by leveraging bundles of resources and capabilities available to the firm (Penrose, 1959; Wernerfelt, 1984). When the resources and capabilities are valuable [V], rare [R], inimitable [I] and non-substitutable [N] (Barney, 1986, 1991, 2001), the firm gains a competitive advantage resulting from the inability of its competitors to imitate its capabilities either through the imperfect substitutability of a resource/capability or due to isolating mechanisms naturally resulting from the development and/or protection of the resource/capability (Peteraf, 1993).

To better understand RBV, it is necessary to understand what is meant by a resource and capability, and their corresponding distinctions. Resources and capabilities can be tangible or

intangible assets (Wernerfelt, 1984) with the main distinction being "[r]esources are stocks of available factors that are owned or controlled by the organization, and capabilities are an organization's capacity to deploy resources" (Amit & Schoemaker, 1993, p. 35). It is through the development of capabilities within the organization that the resources have their value. Thus the uniqueness is built from the path the firm took to build the capabilities and limits those capabilities and factors from being easily transferred or substituted (Lockett & Thompson, 2001).

In addition to path dependency, it is through the bundling of capabilities and resources within a firm that the combination becomes unique (i.e. rare) to the firm. Thus, when factors are traded they lose their ability to be valuable outside of the given firm, and are less likely to be properly imitated or substituted (Peteraf, 1993). This results in the competitive advantage for the firm being attributable to both the resources as well as the context of the firm's capabilities to enable the resources to provide a competitive advantage.

1.3.2 Relational View of the Firm

While RBV looks at the intrafirm (within firm) resources and capabilities, the relational view (RV) of the firm extends RBV to understand how interfirm (between firm) resources and capabilities potentially creates additional sources of competitive advantage via relational rents (Dyer & Singh, 1998). Within the perspective of the relational view (RV), the ability of the firm to build an ongoing relationship with other firms allows for abnormal rents through the interorganizational strategies that are unobtainable via a single firm (Chen et al., 2013; Zajac & Olsen, 1993). As the firm extends beyond its boundaries, the interfirm routines and processes embedded within the relationship allow for the idiosyncratic interfirm linkages to be a source of relational rents and ultimately a competitive advantage (Dyer & Singh, 1998).

1.3.3 Economies of Scale and Scope

The concept of economies of scale is well known in the business and economic literature. This theoretical and mathematical economic concept establishes that through larger levels of production, there is an inherent ability of the firm to reduce the cost per unit (Scherer, 1980). "Economies of scale are best analyzed in terms of three categories: product-specific economies, associated with the volume of any single product made and sold; plant-specific economies, associated with the total output (possibly encompassing many products) of an entire plant or plant complex; and multi-plant economies, associated with an individual firm's operation of multiple plants. Each deserves extended consideration," (Scherer, 1980, p. 81). Through specialization, the firm has the ability to produce large output of a given product/service and build up greater expertise and efficiency in the execution of the job (Scherer, 1980). In general, economies of scale can be associated with the concept of focus.

While the concept of economies of scale is well established, Teece (1982) noted that if we assume firms maximize profit and defer transaction costs we limit our ability to create an understanding of why a firm will take on multiple product (or service) lines. "First cousins to economies of scale are economies of scope, factors that make it cheaper to produce a range of products together than to produce each one of them on its own," Hindle (2008, p. 72). The concept of economies of scope is typically associated with the behavior of diversification (i.e. breadth of services). While specialization within organizational units upon specific products/services yields economies of scale, common inputs (e.g. capital, management, ect.) can be leveraged across organizational units enabling lower cost of joint production (Teece, 1982). This allows for complementarities within/across the firm to form through the leveraging the common inputs and overheads required for the production of the products/services (Kekre & Srinivasan, 1990).

Scale and scope both attempt to meet the population needs while maintaining a quality level necessary to meet market needs. Through the ability to build a specialization and increase scale, quality improves by increasing the efficiency and efficacy in that specialization. This allows for firms to identify the next potential area for exploration through investment and to improve upon economies through the expansion of scope (Chandler, 1990). Through the addition of services – i.e. scope – the hospital is able to expand the view of the heterogeneous patient and leverage its knowledge-base to holistically improve upon the quality of care.

CHAPTER 2 – Environmental Antecedents of Hospital Focus: An Econometric Study

2.1 Motivation

While the concept of focus is a well-established concept in strategy and operations management, understanding why firms choose a focus strategy remains ambiguous. Given that the concept of the "focused factory" being rooted in the foundation of the field by Skinner (1974) and Porter (1980) begs the question why antecedents have not been studied? Many authors have utilized the concept of focus within their research, and most notably works in the hospital domain have become quite fascinated with the concept. Authors such as Clark and Huckman (2012), KC and Terwiesch (2011), and McDermott and Stock (2011) have shown the benefits of hospital focus within a clinical setting. However, it is also important to understand "why" firms focus as well as "how" they benefit to have a holistic view.

There is a dearth of inquiry into the antecedents of focus. There is only the seminal empirical study by Ketokivi and Jokinen (2006) that identifies the lack of understanding of why firms focus, and in particular, what environmental factors motivate the decision to focus. The purpose of this essay is to shed new light on this important question by investigating the possible environmental antecedents identified by Ketokivi and Jokinen (2006).

2.2 Conceptual Model

Strategy is "a set of goals, policies, and self-imposed restrictions that together describe how the organization proposes to direct and develop all the resources invested… as to best fulfill (and possibly redefine) its mission" (Hayes et al., 2005, p. 33). A firm's strategy results from the external environment of the firm (Porter, 1980) and goals the firm desires to pursue. A focus

strategy has been touted as a strategy with the ability to provide greater returns and efficiency than strategies characterized by less focus (Porter, 1980; Skinner, 1974).

This essay explores the relationship between the environment and strategy with an emphasis on factors related to *environment uncertainty* to gain a better understanding of why a hospital may focus. The environment consists of the physical and social factors that are taken directly into consideration in the decision making behavior in a given system (Duncan, 1972). From the conceptualization of the environment, environmental uncertainty is the degree to which the environment produces a situation where the "probability of the outcome events is unknown as opposed to risk situations where each outcome has a known probability" (Duncan, 1972, p. 317). To assess the level of uncertainty, the number of dimensions has generally been reduced to three: (1) munificence, (2) dynamism, and (3) complexity (Aldrich, 1979, 2008; Dess & Beard, 1984).

Environmental munificence is the extent the environment or industry can support sustained growth by the firms contained within the given environment or industry (Dess & Beard, 1984). The literature has shown that in munificent environments firms tend to adopt strategies and structures aimed at capturing growth opportunities (Xue et al., 2011). In a resource rich environment, a firm tends to explore and exploit opportunities (Rosenbusch et al., 2013) with a broadening of specialties. A stable environment, which tends to be indicative of an environment with low munificence (Bradley et al., 2011), tends to be necessary for a firm to focus. The stability of the environment created by a low level of munificence establishes consistency in process and modes of services (Bradley et al., 2011; Porter, 1980). Such consistencies are engendered by a focus strategy and allow the exploitation of existing operational efficiencies and resources (Hayes & Wheelwright, 1984). Since stability is engendered by low levels munificence, this suggests as

munificence increases, the environment becomes more supportive of expansion (exploration) and less conducive towards focus (exploitation).

Hypothesis 1 (H1): Environmental munificence will negatively affect hospital focus.

Environmental complexity is the degree of heterogeneity (i.e., diversity of entities) and concentration (i.e., number of entities) that exist within a system (Aldrich, 1979, 2008; Dess & Beard, 1984). Within the hospital environment, the complexity of the environment is driven by a wide variety of participants: multiple payers, various patient medical conditions, physicians, administrators, etc. As the number of participants increases so does the complexity. This complex environment makes it more difficult to identify, diagnose, and respond to problems (Azadegan et al., 2013) presented in the care of patients, as well as the environment as a whole. However, a focus strategy enables the firm to narrow the range of demands placed upon it (Hayes & Wheelwright, 1984). In the case of cardiac care, there are a limited number of secondary conditions that typically accompany the patient (Clark & Huckman, 2012). By focusing on a specific operational unit or set of process (i.e. DRGs), the complexity presented in the environment is limited. This should reduce the amount of complexity faced by the firm and improve its responsiveness towards the focal customer. This leads to the second hypothesis:

Hypothesis 2 (H2): Environmental complexity will positively affect hospital focus.

Environmental dynamism is the extent to which there is instability and turbulence in the system (Dess & Beard, 1984). Through higher levels of dynamism, it becomes difficult for the

firm to assess change and develop operational responses (Patel et al., 2013). In a dynamic environment, the cause of change can be unknown and will cause unreliability in known system behavior (Azadegan et al., 2013). In the dynamic environment the ability to compete based upon organizational capabilities become even more important for the firm to remain competitive, even more so than markets served (Grant, 1996). Additionally, the dynamic environment encourages the firm to look at improving efficiencies within the firm (Garg et al., 2003), and benefits firms undertaking a strategy that encourages differentiation (Peter T Ward & Duray, 2000). These benefits come from the firm developing resources and capability based advantages (Grant, 1996) that are engendered by a focus strategy, thus,

Hypothesis 3 (H3): Environmental dynamism will positively affect hospital focus.

2.2.1 A Multiplicative View of Environmental Uncertainty

Extant literature recognizes the potential for dimensions of a theoretical concept (e.g. justice, knowledge sharing, etc.) to have potential interaction effects. While environmental uncertainty is represented by three dimensions: munificence, dynamism, and complexity; there has been a lack of investigating the potential synergistic and/or compensatory effects of these three dimensions. Few articles in the literature have explored the interactions of environmental uncertainty, with exception of Boyd (1995) and Bradley et al. (2011). However, Boyd (1995) only utilized environmental interactions as a means of controlling for potential interactional effect, seeing significant results in their model when controlling for the interactions. This identifies that the need to control for interaction effects, in a multiplicative manner, should be considered. Bradley et al. (2011) identified that the interaction of munificence and dynamism influences the relationship

between slack resources and performance; indicating that the potential interaction can potentially affect outcomes. This limited evidence implies that there may be further effects to be considered.

Effects of munificence has been noted to be a driver of firm strategies. The ability of a firm to get capital or resources is imperative to the survival of the firm. Absent the resources necessary there will be severe limitations in the ability for the hospital to provide the necessary products and services required to treat patients, regardless of its choice of strategy. Extant literature noted, "uncertain environments that are also munificent (e.g. high growth industries in initial stages of industrial evolution) are very different from uncertain environments which are far less munificent (e.g., mature industries with declining demand or increasing competition)," (Rajagopalan et al., 1993, p. 584).

As the environment becomes more dynamic, the environment becomes more uncertain, limiting the ability of the hospital to understand the environment. This encourages firms to leverage less-risky, defensive strategies (Menachemi et al., 2011) that utilize standardization and specialization (Begun & Kaissi, 2004). When interacting with increasing levels of munificence, resource availability further enables the firm to leverage resources to build up the strategy, thereby enhancing the level of focus.

Further, as the complexity of the environment increases, the density of competition in the service environment also increases. This encourages hospitals to differentiate themselves from their competition, and develop specializations allowing for a unique set of services, especially in an environment when resources are low (not munificent). However, with increasing levels of munificence influences the ability of the firm to increase service offerings despite strong competition. This will lead to a decreasing level of focus for high levels of complexity.

Finally, with increasing complexity in dynamic environments, revenues and patient needs become more volatile. The "increased dynamism and complexity results in an organization's selection of shorter term and less risky strategies" (Menachemi et al., 2011, p. 278). Hospitals will leverage themselves as specialized in the face of increasing competition to mitigate the uncertainty created from the high levels of complexity and dynamisms. Finally, in lieu of the above arguments, it is likely that these three elements collectively interact to drive focus decisions at the firm.

Hypothesis 4 (H4): Munificence, dynamism, and complexity will multiplicatively affect hospital focus.

2.3 Research Design

2.3.1 Data Source

This essay utilizes four major databases: National Impatient Samples (NIS) for 2008-2011, the American Hospital Association (AHA) Annual Survey for 2011, the Hospital Information Management Systems Society (HIMSS) for 2005-2010, and the Centers for Medicare and Medicaid Service (CMS) from 2008-2011. Each year of the NIS database, which was utilized for the construction of the hospital focus variable, represents 20% sample of U.S. community hospitals – roughly 1000 hospitals ("HCUP Nationwide Inpatient Sample (NIS)," 2011). Unique to this data, unlike files from the Centers for Medicare and Medicaid Services (CMS), is that it contains all discharges for the sampled hospitals within the given year. This included acute care patients without need of long-term (i.e. greater than 25 days) hospitalization and additionally excluded psychiatric hospitals and alcoholism/chemical dependency treatment facilities. This accounted for approximately 7 million inpatient stays from 1000 hospitals for each year of the data. The resulting

data was matched to the antecedent and control variables vis-à-vis their respective state, zip, or AHA identifier. Due to limitations in NIS reporting, the following states were excluded from the sample: Georgia, Indiana, Kansas, Louisiana, Maine, Michigan, Missouri, Nebraska, New Mexico, Ohio, Oklahoma, South Carolina, Tennessee, Texas, and Wyoming.

The four-year (2008-2011) NIS samples allowed for some hospitals to be represented across multiple years, with a total of 4,206 observations accounting for 2,945 unique hospitals. Upon pairing with the antecedent and control variables, the sample size was reduced to 849 observations representing 735 hospitals over two years. This combined panel dataset represents hospitals that accept CMS patients for 35 different states.

2.3.2 Control Variables

The external environment alone does not influence the strategy, in fact, it was noted by Miller (1986) that structure can also influence the strategy of the firm. This is a result of the unique capabilities (structure) having the potential to provide unique opportunities (or disadvantages) for the firm that can be leveraged (or hinder) opportunities for the firm (Aaker, 1989). Given the potential for the structure of the firm to influence the strategy (Peter T. Ward et al., 1995), I control for the hospital's structure.

Contingency theory states that there is no single structure that an organization will undertake that will be effective for all organizations (Donaldson, 1999). In the case of evaluating the contingencies created by organizational structure, the structural contingency theory identifies that there are contingencies that will change the strategy of the firm. To control for these contingencies, a review of the literature was performed within the hospital literature, it has been recognized that certain characteristics of the hospital have the potential to influence the behaviors

of hypothesized models. In particular, structural elements that have been utilized include: location (rural vs. urban) (e.g. Chen et al., 2013; Li & Benton, 2006; Li et al., 2002; Nair et al., 2013), teaching status (e.g. Andritsos & Tang, 2014; Clark & Huckman, 2012; Ding, 2014; Goldstein & Iossifova, 2012; Li & Benton, 2006; Li et al., 2002; Nair et al., 2013; Smith et al., 2013; Stock et al., 2007), and hospital ownership (e.g. Andritsos & Tang, 2014; Ding, 2014; Nair et al., 2013). As a result, controls for *URBAN* (rural vs urban), *TEACHING* status (teaching vs non-teaching hospitals), hospital *OWNERSHIP* (for-profit vs. not-for-profit) and hospital *SIZE* are controlled for within this study. In addition to the standard structural variables, the NIS data also has identified if hospitals are a *MEMBER* of a hospital network. All of the control variables, with the exception of hospital ownership were utilized vis-à-vis the National Impatient Sample (NIS) variable definition.

URBAN is a location variable that is dummy coded such that URBAN = 1 is indicative of a hospital that is located in an urban setting per the AHA Annual Survey of Hospitals vis-à-vis the HCUP Nationwide Inpatient Sample. Urban location is indicative to the statistical area classified as urban by the Metropolitan Statistical Area ("HCUP NIS Description of Data Elements," (2008).

Hospital SIZE is a dummy coded variable based upon the hospital bedsize given in the HCUP NIS description of data elements ("HCUP NIS Description of Data Elements," (2008) such that $HospSize_{Med} = 1$ for those hospitals described as medium and $HospSize_{Large} = 1$ for those hospitals described as large. This defaults the data analysis with the default hospital size being small in size. It should be noted that the bedsize categories are adjusted based upon locational region, locational status, and teaching status (See Appendix A for further details).

TEACHING is a dummy coded variable based upon the identification of the given hospital's teaching status. The NIS *HOSP_TEACH* variable was used as is, with *HOSP_TEACH* = 1 in the NIS dataset being indicative of a hospital that has a teaching focus.

OWNERSHIP is a dummy coded variable based upon the hospital investor status. Based upon the NIS data element *H_CONTRL,* and *OWNERSHIP* = 1 dummy is created for those hospitals that have *H_CONTRL* = 3 in the NIS dataset; this indicates the hospital is an investor-based control (See Appendix A for further details).

MEMBER is dummy coded to equal one based upon the NIS data element *HOSP_MHSMEMBER* = 1, indicative of a hospital being a member of a hospital network.

To properly evaluate the effects of environmental uncertainty on strategy patient conditions must also be contolled for. A case mix index (CMI) to control for the potential complications in the care provided by each hospital in the study is used for this purpose. This information was collected from the Centers of Medicare and Medicaid (CMS) annual IPPS Final Rule Data files. These data were matched to the individual hospitals via their CMS ID. Furthermore, while the NIS database tends to provide a statistically representative national sample, the sample is also built up according to the four identified U.S. regions (Northeast, South, Midwest, and West). To control for potential regional variance, a dummy-variable control for the four major regions (Northeast, Midwest, Southwest, and West) was included.

2.3.3 Independent and Dependent Variable Definition

2.3.3.1 Hospital Focus

As mentioned previously, the various levels (process, operational unit, and hospital) of focus in the hospital environment have been assessed in a multitude of ways. In order to assess consistency

across the measures, the theoretical model was analyzed with multiple measures of focus. These measures are:

FOCUS_BINARY. Based upon Porter's (1980) classical definition of focus as a limited breadth of services, a binary variable was created to be representative of those hospitals that were highly focused at the MDC-level. Patients were counted each year by the MDC they were treated under. From there the MDCs were counted if they had treated patients, with MDCs with less than 5% of patients treated removed from the count to adjust for spurious treatments. Hospitals that had four MDCs or less were then given FOCUS_BINARY = 1, while all others were set equal to zero. Robustness was checked for three and five MDCs as well.

FOCUS_HHI. The Herfindahl-Hirshman Index (HHI) measure utilized a technique similar to Ding (2014) to measure hospital focus. Based on the diversification literature (Chatterjee & Blocher, 1992; Ding, 2014; Hendricks & Singhal, 2003), HHI is utilized to measure the concentration of specific admissions by MDC. HHI identifies the extent to which a hospital focuses on a MDC or a set of MDCs. This was done by summing the squared share of the total patients admitted under a specific MDC admission against all admissions. Thus a high HHI is indicative of a high-level of hospital focus and a low HHI is indicative of a less focused hospital. The FOCUS_HHI measure is defined as:

$$Focu_{HHI(MDC)} = \sum_{j} \left(\frac{Patients_{jh}}{\sum_{j} Patients_{jh}} \right)^2 \forall\, h$$

$$j = a\ given\ MDC$$

$$h = a\ specific\ hospital$$

This measure variable was also created at the DRG level, where the HHI was calculated based upon the sum of the DRG admissions divided by the total number of admissions for the hospital. The formula is as follows:

$$Focus_{HHI(DRG)} = \sum_{k} \left(\frac{Patients_{kh}}{\sum_k Patients_{kh}} \right)^2 \forall\, h$$

$$k = a\ given\ DRG$$

$$h = a\ specific\ hospital$$

FOCUS_Pmax. The Berger-Parker Dominance was calculated at the MDC level by assessing the proportion of patients that were admitted by MDC to the total hospital admissions. From there the proportion that was the maximum was used as an indicator of the hospital's level of focus. This procedure was also performed at the DRG level.

$$p_{\max(MDC)} = \max \left\{ \frac{Patients_{jh}}{\sum_j Patients_{jh}} \ \forall\, j \right\}$$

$$p_{\max(DRG)} = \max \left\{ \frac{Patients_{kh}}{\sum_k Patients_{kh}} \ \forall\, k \right\}$$

$$j = a\ given\ MDC$$

$$k = a\ given\ DRG$$

$$h = a\ specific\ hospital$$

FOCUS_J. In addition to the measures rooted in richness and proportional diversity, a reversed evenness measure is also introduced that looks at the degree of unevenness. To operationalize this measure, evenness was calculated and then multiplied by negative one so that hospitals with high levels of focus (i.e low levels of evenness) would be represented by a larger number than those hospitals with a low level of focus (i.e. high levels of evenness). The formula for unevenness at the MDC and DRG levels are provided next:

$$-J_{MDC} = -\frac{\sum(p_j * \ln p_j)}{\ln S_j}$$

$$-J_{DRG} = -\frac{\sum(p_k * \ln p_k)}{\ln S_k}$$

2.3.3.2 Environmental Uncertainty

As this study utilizes secondary data sources for data analysis, it is necessary to build the environmental uncertainty variables – munificence, dynamism, and complexity – utilizing econometric techniques similar to those developed by Dess and Beard (1984) and Keats and Hitt (1988).

Environmental Munificence is the degree to which there is capacity for the environment to support growth (Aldrich, 1979; Dess & Beard, 1984; Keats & Hitt, 1988). Through their work, Dess and Beard (1984) recommended that industry sales was a primary factor in environmental munificence. Given the limited availability of revenue data in the HIMSS database, statewide munificence variables were created. Similar to what was described by Dess and Beard (1984), the natural log of revenues were regressed upon years over a three-year period. The following is the formulation:

$$y_t = b_0 + b_1 t + a_t,$$

where y = ln (average statewide revenues),

t = the year, and

a = the residual.

Based upon the regression, the munificence measure is the antilog of the regression coefficient (Keats & Hitt, 1988):

$$MUNIFICENCE = \exp(b_1).$$

Environmental Dynamism is the extent to which there is variance in the environment (Keats & Hitt, 1988), and is measured in a similar manner to environmental munificence. The degree of dynamism was calculated similar to Keats and Hitt (1988) by calculating the antilog of the standard error of the regression coefficient in the aforementioned regression:

$$DYNAMISM = \exp[s.e.(b_1)]$$

Environmental Complexity is the degree of heterogeneity and concentration of the environment (Keats & Hitt, 1988). To this extent, environmental complexity was measured based upon the concentration of hospitals within 50 miles of a given hospital. This was accomplished by calculating the surface distances between all the hospitals within the American Hospital Association's 2011 database. Based upon the zip-code for each hospital, the longitude and latitude coordinates were identified and the distance between each pairwise set of locations was calculated vis-a-vis the Haversine Formula (Robusto, 1957). The environmental complexity was then calculated to be the natural log of the total number of hospitals within 50 kilometers

$$COMPLEXITY = \ln(\sum(Hospitals\ within\ 50\ kilometers))$$

2.4 Research Method and Results

Table 3 gives the summary statistics for the independent and dependent variables used in the analysis. Given the availability of secondary data, the panel was designed using two time periods. A random effects (RE) regression was performed since the model was looking at between hospital comparisons for the focus variable. The final sample was 849 observations with 735 groups, with an average 1.2 observations per group over a two year period. The fixed effects (FE) model was unable to be properly ran due to a low number of observations per group, nor did it seem

theoretically reasonable given that the study emphasizes between group comparisons. To control for heteroscedasticity issues the RE linear regression were ran with robust standard errors.

Additionally, it was important to mitigate for endogeneity, for the calculation of munificence and dynamism were done such that the third year of the regression was one year prior to the year that focus was being measured. As mentioned in Sharma et al. (2016), this method of lagged exogenous variables is "common practice in literature when it is difficult to derive exogenous instruments." Given the limited nature of the data, and to prevent further loss of sample size, this method was used to maintain confidence in the results. Table 4 contains a summary of the results.

2.4.1 Direct Effects of Environmental Uncertainty on Hospital Focus

Hypotheses H1 - H3 posited that environmental munificence, complexity, and dynamism have a positive relationship with hospital focus, respectively. In the presence of the full interaction model, all models had a non-significant direct relationship between environmental munificence and hospital focus, resulting in no support for H1. With the exception of the p_{max} focus variable, all other measures supported H2 by having a positive relationship between environmental dynamism and hospital focus. Finally, with the exception of the binary form of focus, the remaining measures showed strong support for the positive relationship between environmental complexity and hospital focus indicating support for H3.

2.4.2 Interaction Effects of Environmental Uncertainty on Hospital Focus

The binary form of hospital focus showed no significant interactions; however the remaining focus

Table 3: Correlation between focus and environmental uncertainty measures

		Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1	Focus Binary (MDC ≤ 3)	.089	.285	1									
2	Focus Binary (MDC ≤ 5)	.299	.458	.478**	1								
3	Focus HHI(MDC)	.145	.114	.683**	.502**	1							
4	Focus P_{max}(MDC)	.242	.133	.640**	.550**	.956**	1						
5	Focus -J(MDC)	-.777	.108	.686**	.579**	.920**	.899**	1					
6	Focus HHI(DRG)	.053	.062	.585**	.457**	.782**	.751**	.702**	1				
7	Focus P_{max}(DRG)	.144	.094	.566**	.523**	.738**	.756**	.703**	.937**	1			
8	Focus -J(DRG)	-.756	.086	.519**	.540*	.485**	.481**	.481**	.649**	.729**	1		
9	Munificence	.974	.143	-.080**	-.092**	-.065**	-.074**	-.070**	-.080**	-.103**	-.129**	1	
10	Dynamism	1.161	.109	.036**	.064**	.024	.032**	.032	.048**	.054**	.000	-.236**	1
11	Complexity	2.587	1.228	.070**	.064**	.069**	.061**	.114**	.073**	.089**	.270**	.134**	-.261**

Note: ^ $p < .10$; * $p < .05$; ** $p < .01$

Table 4: Random effects (RE) regression models for hospital focus

	MDC				DRG		
FOCUS	Binary	HHI	Pmax	-J	HHI	Pmax	-J
MIDWEST	1.21**	.023	.025	.024^	.023**	.038**	.027**
	.373	.013	.015	.012	.008	.013	.010
SOUTH	.519	.000	.007	.003	-.000	.003	.000
	.383	.094	.011	.009	.005	.008	.007
WEST	.900*	.011	.016	.028**	.015**	.033**	.030**
	.360	.010	.011	.010	.005	.009	.008
MEMBER	-.292	-.021**	-.022*	-.013	-.014**	-.024**	-.014*
	.229	.009	.010	.007	.004	.007	.006
CMI	-.021	.088	.081^	.074*	-.003	-.014	-.024
	.419	.043	.043	.036	.018	.026	.019
MEDIUM	-.919**	-.067**	-.078**	-.063**	-.022**	-.028*	-.000
	.270	.015	.016	.013	.008	.011	.009
LARGE	-1.175**	-.085**	-.102**	-.086**	-.025**	-.035**	.002
	.278	.018	.019	.016	.009	.013	.011
TEACH	-.483	-.051**	-.063**	-.055**	-.018**	-.031**	-.007
	.290	.013	.013	.011	.006	.009	.007
OWNER	.581^	.029*	.031*	.029*	.015^	.019	.008
	.312	.013	.014	.012	.008	.012	.010
LOCATION	.122	-.017	-.016	-.013	.003	.013	.024**
	.382	.032	.046	.012	.007	.010	.008
MUNIFICENCE	2.391^	-.006	-.027	-.000	-.015	-.028	-.014
	1.673	.031	.048	.036	.019	.034	.037
COMPLEX	.163	**.010***	**.013***	**.010***	**.008***	**.011***	**.010***
	.190	**.005**	**.007**	**.005**	**.003**	**.005**	**.005**
DYNAMISM	**5.905****	**.125***	**.126***	**.136***	**.063***	.075^	**.117***
	2.253	**.055**	**.071**	**.062**	**.034**	.056	**.068**
MUNIF x COMPLEX	-1.690	-.030	-.077^	-.018	-.032^	-.052^	-.009
	1.062	.031	.045	.033	.020	.034	.035
MUNIF x DYNAM	4.367	**.307****	**.329***	**.305***	**.146***	.140^	.116
	5.331	**.099**	**.148**	**.121**	**.065**	.109	.142
DYNAM x COMPLEX	-3.817^	-.050	-.119^	-.036	-.034	-.070	-.006
	2.020	.054	.066	.056	.030	.051	.053
MUNIF x DYNAM x	-.168	.240^	.268^	**.249***	.150^	.200^	.159^
COMPLEX	3.933	.128	.172	**.128**	.078	.125	.127
Constant	-11.25	-.071	.047	-1.01**	-.007	.082	-.889
	3.93	.088	.117	.103	.053	.089	.102
X^2	54.94	103.43	88.07	114.02	69.96	86.85	74.48
$p > X^2$	.000	.000	.000	.000	.000	.000	.000
R^2		.194	.187	.208	.123	.138	.094

Note: ^ p <.10; * p < .05; **p <.01

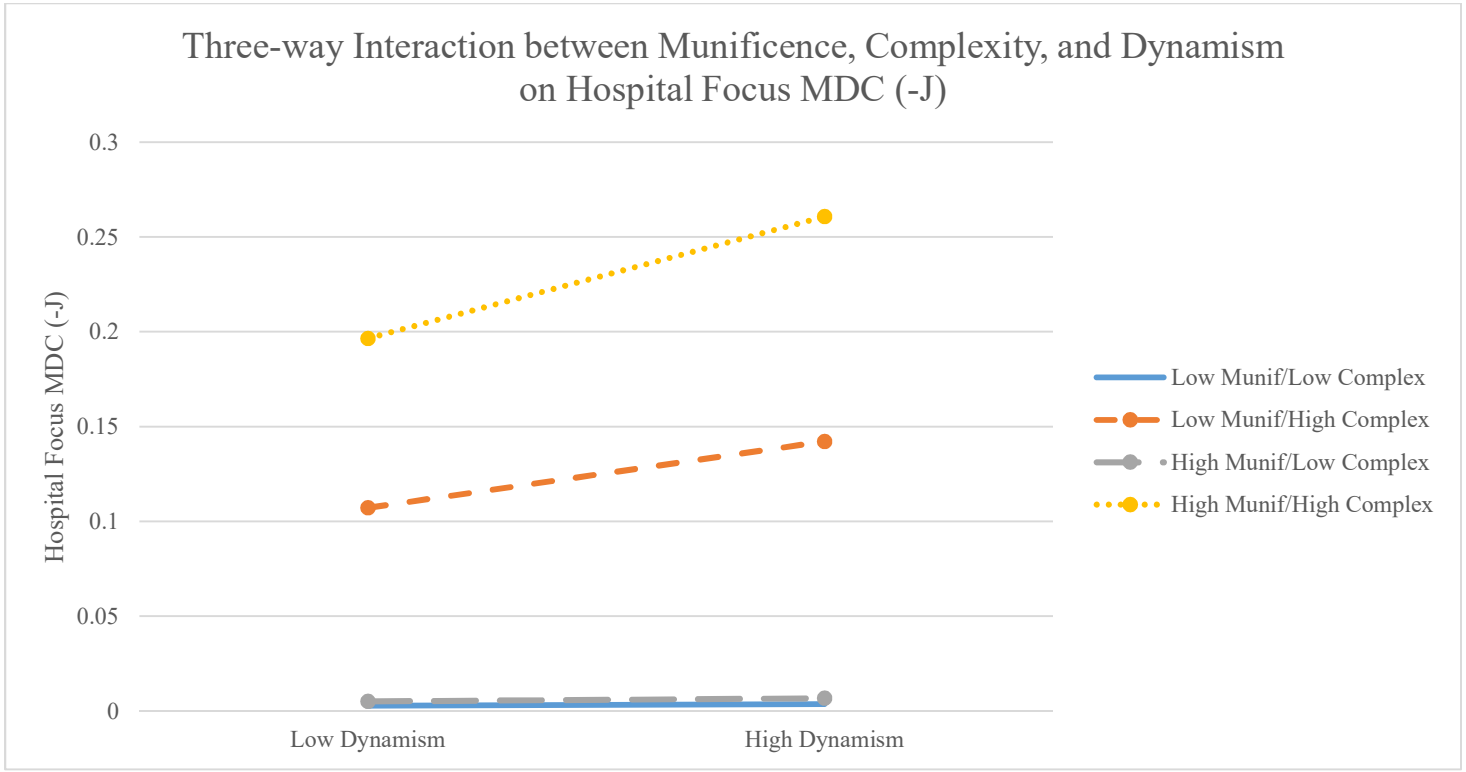


Figure 3: Three-way interaction between munificence, complexity, and dynamism

interactions showed positive relationships between munificence and dynamism; as well as the introduced three way interaction. Hypothesis 4 posited that a multiplicative interaction between the environmental uncertainty dimensions would affect focus. A Wald-test jointly tested if the interaction effects were equal to zero. The Wald-test was statistically significant showing that the multiplicative effects for the MDC-levels of focus (binary X^2 = 5.41, p <.248; HHI X^2= 32.32, p <0.00; p_{max} X^2 = 22.74, p<..000; -J X^2 = 22.74, p<.000) and the DRG-levels of focus (HHI X^2 = 19.04, p<.000; p_{max} X^2 = 12.16, p<.05; -J X^2 = 4.13, p >.100) were significant with the exception of the MDC-level binary measure of focus and the DRG-level measure of negative evenness ($-J_{DRG}$). There was no consistent support for the interaction effect between munificence and complexity, with only the p_{max} (-.077, p<.05) measure of focus being significant. The interaction between munificence and dynamism was partially supported with many of the focus measures being significant. The interaction between dynamism and complexity was not significant for a majority of the measures, indicating little support for that interaction.

Lastly, all the measures of focus, except the binary, were significant or marginally significant for the three-way interaction between munificence, dynamism, and complexity. Looking at only the three-way interaction (See Figure 3), when complexity is low, the three-way effect is nearly zero. However, when complexity is high, the three-way interaction is positive and is more impactful when munificence is high. Similar results were seen for the DRG measures.

2.4.3 Robustness Checks

A variety of robustness checks were performed to validate the results. Given the hierarchical nature of the data, several multilevel mixed-effects models were performed to account for state and regional multilevel effects. Multilevel effects were found to be insignificant, and the directionality

and significance of the estimation coefficients remained the similar. Furthermore, with an average number of observations being 1.2, a series of OLS estimations were performed to check for consistency of the results. Several coefficient estimates dropped slightly, resulting in some significant estimates at the .05 level dropping to the .10 level.

Robustness checks were also performed for the binary measure of focus. Additional binary measures of focus were developed for three or less MDCs and five or less MDCs, along with a binary measure that identified hospitals that had 66% of their patients in a single MDC. This latter measure was created since the U.S General Accounting Office (GAO) identifies a specialty hospital as a hospital having two-thirds of its inpatient claims reside within one or two major MDCs (GAO, 2003). As shown in Table 5 there were inconsistencies with the results of the binary variable. While several of the structural controls were consistent, in particular Midwest region, medium hospitals, and large hospitals; many of the environmental variables were not consistent, with only dynamism being significant and positive for two of the four.

2.5 Discussion

This essay is the first step in understanding the antecedents of a focus strategy in a service domain, and complements the work performed by Ketokivi and Jokinen (2006) by expanding the understanding of antecedents of a focus strategy. While the work performed by Ketokivi and Jokinen (2006) address some potential antecedents of product-process manufacturing focus, this is a seminal study to explore the potential antecedents in a service environment, namely hospitals. This essay additionally responded to their request for a better understanding of how the environment influences the firm's decision to focus.

Based upon the results of the study, the ability to look at different environmental

Table 5: Hospital focus binary variable at different levels

	MDC ≤ 4	MDC ≤ 3	MDC ≤ 5	66% in 1 MDC[4]
MIDWEST	+	+	+	+
SOUTH				
WEST			+	
MEMBER				-
CMI				+
MEDIUM	-	-	-	-
LARGE	-	-	-	-
TEACH		-		-
OWNER				
LOCATION				
MUNIFICENCE				
COMPLEX				
DYNAMISM	+	+		
MUNIF x COMPLEX				
MUNIF x DYNAM		+		
DYANM x COMPLEX				
MUNIF x DYNAM x COMPLEX				

Note: + = positive and significant at p <.05, - = negative and significant at p <.05,

uncertainty measures is no longer straightforward. While in the hospital environment, dynamism may engender a focus strategy, other synergistic effects are seen from other dimensions of uncertainty – namely munificence. A resource intensive environment alone is not enough for a hospital to focus, but munificence can amplify the effect of dynamism such that even at low levels of dynamism higher than normal levels of focus may occur.

Additionally, the three-way interaction introduced to the model for the purposes of having a complete view, had additional insights to be considered. This study provided a complete view of environmental uncertainty and its multiplicative effects. This provides a clearer understanding of

[4] A specialty hospital is when 66% of the patients serviced utilize one or two MDCs (KC & Terwiesch, 2011).

the effect of environmental certainty on a hospital's degree of focus. In particular, it looks like the lack of complexity, albeit competitive complexity the way the variable was measured, can dampen the potential multiplicative effects from the three-way interaction. However, in environments where there is a high degree of competitive complexity, it is likely to see hospitals specializing faster in a resource intensive environment (munificent) and a dynamic environment.

Upon review of the differing measures of hospital focus, the binary focus variables did not yield much in the way of significant results. This shows perhaps that the classical view of focus presented by Skinner (1974) and Porter (1985) – that implies limited breadth – may not hold in a service environment, supporting McLaughlin's (1995) contention that focus is more of an emphasis in services rather than a reduction in breadth of services. This provides support for continued use proportional, concentration, and evenness measures in the future.

2.6 Limitations

A major limitation in this study is the gap in time between the independent and dependent variables. Strategy at the firm level involves long-term planning and the firm's structural limitations may hinder the ability of the firm to change its strategy (Hayes et al., 2005). Due to the lack of continuity and limited time horizon, the ability to see changes within the individual hospitals vis-à-vis a fixed effects model essentially makes this study cross-sectional. Due to this limitation, inference from this study relies heavily upon the theoretical underpinnings.

Another major limitation is the diminished sample size. Due to the merging of databases, the ability to maintain the higher level of sample size was not feasible. Given that the data from NIS contains all the patient records for the given year, an estimation of the CMI by hospital may be possible, and should be pursued in future studies. This could be done by calculating the CMI

utilizing the weights provided by CMS. Given the large number of previous studies that have utilized CMS data for their analysis, this additionally would provide an interesting opportunity to perform a study on the difference between CMS patient data and the entire population of the hospital.

The final, and perhaps most critical, is the measurements lacked the understanding of the hospital management perceptions. Given that much of strategy is related to the perception of the environment limits this research. While the secondary measures have been validated by the literature, they are purely substitutes for a perceptual survey. Subsequently, the secondary measures also don't account for highly specialized focal areas such as cystic fibrosis that has low number of patients, but hospitals with a strong focus on that ailment.

CHAPTER 3 – Hospital Focus, Breadth, & the Triple Aim: Breaking the Mold of Service Focus

3.1 Motivation

"Of all outstanding characteristics of business firms perhaps the most inadequately treated in economic analysis is the diversification of their activities," (Penrose, 1959, p. 104).

The operations management literature has resoundingly shown that service focus within a hospital setting tends to lend itself towards higher than normal performance. However, many authors have limited their study to specific diseases and specialties for their research frame – in particular that of cardiac care (e.g. KC & Terwiesch, 2011; McDermott & Stock, 2011). In general this limits the generalizability of focus. This limitation has shown that departmental (i.e. MDC) levels of focus do not translate to some firm level benefits (e.g. length of stay and mortality rate) when controlling for selective admissions at the departmental level (KC & Terwiesch, 2011). To address the limitations of evaluating the effects of departmental focus on the firm level, Ding (2014) evaluated firm-level focus by evaluating focus as an HHI measure.

This set of hospital literature has demonstrated that focus through learning and economies of scale can result in improved firm performance, but has been limited in its attempt to understand the extent of scope required by hospitals to achieve these outcomes. When viewing focus as an emphasis, there is the potential for breadth of services to create synergies (McDermott & Stock, 2011). Clark and Huckman (2012) explored the role breadth of services influenced service focus performance by understanding how spillovers and complementarities enable cardiac care improvements; but similar to other works, this limited the generalizability to the firm level.

Given the limitations in the literature to this point, there is a lack of understanding of how firm-level focus and service breadth, in tandem, impact the ability of the firm to perform. This essay aims to expand the understanding of focus, and looks at the impact of service focus, service breadth, and population health (one dimension of the Triple Aim) upon two other dimensions of the Triple Aim performance framework.

3.2 Conceptual Model

As mentioned in the literature review, hospital focus has been identified as a potential for achieving higher levels of performance outcomes. It is through the specialization in a specific set of tasks to meet an objective (Skinner, 1974) that a firm (i.e. hospital) has the ability to specialize and gain a source of competitive advantage. However, while focus may lead to improved outcomes, this does not necessarily lead to a reduction of breadth; rather it leads to alignment of the other resources within the hospital (McDermott & Stock, 2011).

The resource based view (RBV) identifies that capabilities utilized by a firm (i.e. hospital) must be of valuable, rare, inimitable and not easily substituted for the firm to achieve superior rents (Barney, 1991). Such capability can be tangible or intangible in nature, and include organizational processes and routines (Barney, 2001) indicative of hospital focus. Through the hospital focusing on a specific set of specialties, the firm has the ability to differentiate itself from the competition via economy of scope, thereby creating a set of skills unique to the focused hospital (McLaughlin et al., 1995); this should result in superior rents, or in the case of a hospital, superior outcomes. The operations and management literature supports this claim identifying that focus allows for improved performance at lower cost creating a competitive advantage for the focal firm (Porter, 1985; Skinner, 1974). By focusing on a set of conditions (e.g. cardiology) that the hospital

should see improved costs (Ding, 2014; McDermott & Stock, 2011), reduced mortality rate (Clark & Huckman, 2012; KC & Terwiesch, 2011), reduced length of stay (KC & Terwiesch, 2011), and reduction of hospital readmissions (Ding, 2015). Most of these examples identify, in essence, that quality outcomes related to the focal area and the associated costs are reduced. Given the past literature, I posit the following baseline hypotheses:

Hypothesis 1 (H1): Hospital focus will positively affect experience of care.

Hypothesis 1a (H1a): Hospital focus will have a positive effect on patient experience

Hypothesis 1b (H1b): Hospital focus will have a positive effect on process of care

Hypothesis 2 (H2): Hospital focus will negatively affect cost of care (i.e. reduce costs).

However, as Skinner (1974) said, "a factory cannot perform well on every yardstick," (p.115). While it is expected that a focused hospital may "cherry-pick" by attracting patients (KC & Terwiesch, 2011) this does not mean that the serviceability aspect of the hospital will be able to keep up with the patient needs if the degree of focus is further increased. Similarly, with the desire to improve the population health a focused hospital will typically be limited in the set of conditions it can treat with superior quality. Given that studying the effects of a population's health is a new research area for hospital operations management (Berwick et al., 2008), it is important to first evaluate the effect of the population's health upon the other dimensions of performance. Based upon the prior literature it is expected that the population health will have an impact on the ability of the hospital to meet the needs of the firm and thusly the ability of the firm to affect the experience of care and corresponding cost efficiency. As the population's health increases, it is

expected that there will be fewer medical issues, and as a result, fewer issues in the delivery of care.

Hypothesis 3 (H3): Population health will positively affect experience of care

Hypothesis 3a (H3a): Population health will positively affect experience of care.

Hypothesis 3b (H3b): Population health will positively affect process of care.

Hypothesis 4 (H4): Population health will negatively affect cost of care (i.e. reduce costs).

Breadth is typically viewed as the dichotomy of a focus strategy. However, in the services and hospital literature, it has been suggested that breadth does not inherently conflict with focus, but rather in a focused firm (i.e. hospital) that the other resources within the firm align to support the focal area (McDermott & Stock, 2011; McLaughlin et al., 1995). It is through diversification (i.e. increasing breadth of services) that a firm is able to match the target market's/markets' needs (Peteraf, 1993) through the its ability to provide greater service bundles that meet the needs of their patients. At low levels of breadth, hospitals are better able to focus and providing superior customer experience. However, as breadth increases the complexity associated with the additional services prevents the hospital from providing high customer service, resulting the reduction of patient experience (cf Peteraf, 1993). As the number of services increase to higher levels of breadth, each additional service adds marginal complexity while simultaneously increasing the service bundle options available to the patient. This allows for a larger variety of patient needs to be met and results in higher levels of patient experience.

Hypothesis 5 (H5a): Breadth of services will affect patient experience in a curvilinear fashion (positive-U). Such that at a low level of breadth, hospitals are better able to focus on providing superior customer experience. With increasing breadth, it is likely that the increased complexity of managing the services deters from providing high customer experience, reducing customer experience. Finally as the breadth of services increase further, hospitals may likely find more synergies among the different operational units for patients and be able to improve customer experience.

Additionally, as the breadth of services increases the ability of the hospital to provide service bundles that meet their patient needs increases. However, this will increase the cost and the complexity in providing care. At low levels of breadth the process of care is fairly standardized for both cost and process. As the number of services increase, resources required to provide those services will also increase an increase in cost. However for each additional service, economies of scope can be leveraged through the cross-utilization of common resources across the operational units. This will result in costs that increase, but at a diminishing rate. Similarly, process of care will see large improvements as the breadth of services increase, however as the number of services increase, there is a marginal benefit that can be extracted (cf Peteraf, 1993) and ultimately result in diseconomies of scope for very high levels of process of care. This will result in process of care seeing an optimal level of services with regards to process of care.

Hypothesis 5b (H5b): Breadth of services will affect process of care in a curvilinear fashion (inverted-U). Such that at low levels of breadth, process of care will be low; and as breadth of services increases, process of care will increase but at a decreasing rate. This will result in a flattening of costs at very high levels of breadth.

Hypothesis 6 (H6): Breadth of service offerings will affect cost of care in a curvilinear fashion (inverted-U). Such that at low levels of breadth, cost of care will be low; and as breadth of services increase there will be an increase in cost of care, but at a diminishing rate. Eventually, at high levels of breadth diseconomies of scope will result in a decrease in cost of care.

In addition to the direct effects, the interaction between focus and breadth together is supported in the limited extant literature. Clark and Huckman (2012) noted that through the inclusion of complementary fields to cardiac care, that there were benefits seen by the hospital. Additionally, there are similarities between focus, economies of scale, and exploitation concepts; and similarities between breadth, economies of scope, and exploration concepts. While both exploration and exploitation strategies will allow for their respective economies, exploration allows for firms leveraging their existing knowledge base to expand and innovate (Hitt et al., 1997; Teece, 1982). Consistent with the McLaughlin et al. (1995) definition of service focus it is expected that focus will enable higher level of performance through the coordination of a broader service offering. As the number of service offerings increase the patient experience should increase quadradically with respect to breadth such that the rate will increase for higher levels of focus than it would for lower levels of focus. This is a result of the unique, offerings being bundled with the highly specialized services of the focal area.

Hypothesis 7 (H7): The interaction of focus and breadth will affect patient experience in a U-shaped manner; such that at low levels of breadth, increasing focus dampens the impact of breadth

on patient experience, and at high levels of breadth increasing focus strengthens (i.e. increases the rate) of the impact of breadth of patient experience.

At a high level of focus, and a low level of breadth, the process of care is highly standardized. As breadth of services increases from low to moderate levels, the ability of the hospital to provide adequate care increases. This is a result of the hospital being able to provide the effects associated with spillovers conditions for the focal population (cf Clark & Huckman, 2012). However, as the breadth of service increases from moderate to high levels, the associated complexity interferes with the ability of the hospital to provide high levels of service and cause a decrease in the process of care.

Hypothesis 8 (H8): The interaction of hospital focus and breadth of services will affect process of care in a curvilinear fashion (inverted-U); such that the interaction will be increasing for low to moderate levels of breadth, decreasing for moderate to high levels of breadth, and stronger for higher levels of focus than lower levels of focus.

Similarly costs will increase for each additional service added by the hospital. However, due to economies of scope the hospital has the ability to leverage common resources (e.g. nurses, admiration, IT, etc.) across the entire breadth of services. Through the ever increasing staturation of services it is expected that each additional service will increase cost at a decreasing rate. When interacted upon by focus, resources are inherently more aligned towards the common mission

associated with the focused strategy (Hayes & Wheelwright, 1984; Porter, 1980). This will result in costs increasing at a slower rate, and diminishing faster than for an unfocused hospital.

Hypothesis 9 (H9): The interaction of hospital focus and breadth of services will affect cost of care in a curvilinear fashion (inverted-U); such that the interaction will flatten out as breadth increases and cost of care will be lower overall for high levels of focus.

3.3 Research Design

The research data and variables used a similar method as CHAPTER 2 – Environmental Antecedents of Hospital Focus: An Econometric Study. To that extent, the design is repeated in the next few subheadings.

3.3.1 Data Source

This essay utilizes four major databases: National Impatient Samples (NIS) for 2011, the American Hospital Association (AHA) Annual Survey for 2011, the Centers for Medicare and Medicaid Service (CMS) from 2013 through 2014, and the County Health Ratings and Roadmaps' Health Rankings for 2013. For each year of the NIS database, which was utilized for the construction of the hospital focus variables, represents 20% sample of U.S. community hospitals – roughly 1000 hospitals ("HCUP Nationwide Inpatient Sample (NIS)," 2011). Unique to this data, unlike files from the Centers for Medicare and Medicaid Services (CMS), is that it contains all discharges for the sampled hospitals within the given year. This included acute care patients without the need of long-term (i.e. greater than 25 days) hospitalization and additionally excluded psychiatric hospitals and alcoholism/chemical dependency treatment facilities. This accounted for approximately 7 million inpatient stays from 1000 hospitals for each year of the data. The resulting data was

matched to the dependent variables and control variables vis-à-vis their respective state, zip, AHA identifier, or CMS identifier. Due to limitations in NIS reporting and the data element utilized for pairing with other databases, the following states were excluded from the sample: Georgia, Indiana, Kansas, Louisiana, Maine, Michigan, Missouri, Nebraska, New Mexico, Ohio, Oklahoma, South Carolina, Tennessee, Texas, and Wyoming.

3.3.2 Control Variables

URBAN is a location variable that is dummy coded such that URBAN = 1 is indicative of a hospital that is located in an urban setting per the AHA Annual Survey of Hospitals vis-à-vis the HCUP Nationwide Inpatient Sample. Urban location is indicative to the statistical area classified as urban by the Metropolitan Statistical Area ("HCUP NIS Description of Data Elements," (2008).

Hospital SIZE is a dummy coded variable based upon the hospital bedsize given in the HCUP NIS description of data elements ("HCUP NIS Description of Data Elements," (2008) such that $HospSize_{Med}$ = 1 for those hospitals described as medium and $HospSize_{Large}$ = 1 for those hospitals described as large. This defaults the data analysis with the default hospital size being small in size. It should be noted that the bedsize categories are adjusted based upon locational region, locational status, and teaching status (See Appendix A for further details).

TEACHING is a dummy coded variable based upon the identification of the given hospital's teaching status. The NIS *HOSP_TEACH* variable was used as is, with *HOSP_TEACH* = 1 in the NIS dataset being indicative of a hospital that has a teaching focus.

OWNERSHIP is a dummy coded variable based upon the hospital investor status. Based upon the NIS data element *H_CONTRL,* and *OWNERSHIP* = 1 dummy is created for those

hospitals that have *H_CONTRL* = 3 in the NIS dataset; this indicates the hospital is an investor-based control (See Appendix A for further details).

MEMBER is dummy code to equal one based upon the NIS data element *HOSP_MHSMEMBER* = 1, indicative of a hospital being a member of a hospital network.

Additionally, given that this dissertation will be evaluating strategy, the need to control for the patient conditions is necessary. To this extent I also utilized the case mix index (CMI) to control for the potential complications in the care provided by each hospital in the study. This information was collected from the Centers of Medicare and Medicaid (CMS) annual IPPS Final Rule Data files. These data were matched to the individual hospitals via their CMS ID. Furthermore, while the NIS database tends to provide a statistically representative national sample, there are regional controls that were included to help control for any regional variables that cannot be controlled for. Each hospital can be placed within one of four major regions (Northeast, Midwest, Southwest, and West). Given that there is the potential for regional clustering, region dummy codes were created and controlled for.

3.3.3 Independent and Dependent Variables

The variable definitions for focus are the same as what was used within CHAPTER 2. These measures were used to evaluate the consistency of the results across multiple measures of focus. However, given that the strategic intent of a hospital will typically be at the MDC level, and to prevent multicollinearity issues with the measure of breadth, the DRG level measures were dropped for this essay.

AVG_BREADTH was created by assessing the average breadth of service utilized across each of the MDCs utilized by the patients. This was performed by counting the DRGs under each

MDC and averaging the DRGs across MDCs. The dependent variables of *PATIENT_EXPERIENCE, PROCESS_OF_CARE*, and *COST_EFFICENCY* were pulled from the 2014 CMS Hospital Compare Database; note: *COST_EFFICIENCY* was replaced with its inverse measure *COST_OF_CARE.* These variables were paired with the NIS data by matching their AHA identifier with the corresponding CMS identifier.

POPULATION_HEALTH was created by adding up the standardized values of key health indicators for the county that the hospital resides within and then multiplying by a negative one so that a larger number is indicative of a healthier population. The selected measures were 1) years of potential lost life, 2) percentage of adults that report fair or poor health (age-adjusted), 3) poor mental health days, 4) percentage low birth weight, 5) percentage of smokers, and 6) percentage of obese. These data were collected via the countyhealthrankings.com website for the 2013 year.

3.4 Research Methods and Results

The summary statistics for the independent and dependent variables utilized in the analysis can be seen in Table 6. With the available data, the model was built in a cross-sectional manner with a time lags between the variables. The independent variables – FOCUS and AVG_BREADTH – were built from the 2011 NIS database. The measure for POPULATION_HEALTH was built up for the 2013 year from the County Health Rakings. Finally the dependent variables *PATIENT_EXPERIENCE, PROCESS_OF_CARE*, and *COST_EFFICENCY* were pulled from the 2014 CMS Hospital Compare Database. A linear regression model was performed for each of the focus variables, and checked for multicollinearity and heteroscedasticity. For all the models ran without the interaction effects, the no single VIF measured higher than 7.81, with highest average

Table 6: Correlation table between focus, breadth, Triple Aim measures, and controls

		Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11	12
1	PROCESS_OF_CARE	43.334	12.419	1											
2	PATIENT_EXPERIENCE	11.878	5.457	.090	1										
3	COST_OF_CARE	.966	.132	-.021	-.316	1									
4	MIDWEST	.291	.454	.033	.210	-.072	1								
5	SOUTH	.398	.489	.104	.067	.049	-.521	1							
6	WEST	.187	.390	-.040	-.070	-.117	-.308	-.390	1						
7	MEDIUM	.236	.425	-.013	-.094	.091	-.110	-.006	.102	1					
8	LARGE	.298	.458	.058	-.103	.115	-.037	-.005	.035	-.363	1				
9	MEMBER	.517	.500	.211	-.024	.060	-.040	.034	.034	.027	.067	1			
10	CMI	1.451	.284	.126	.041	.054	-.046	-.133	.242	-.111	.232	.122	1		
11	TEACH	.172	.378	-.047	-.096	.114	-.026	-.085	-.011	.053	.118	.053	.371	1	
12	OWNER	.162	.369	.235	-.143	.018	-.282	.362	.014	-.006	-.047	.154	.019	-.199	1
13	LOCATION	.597	.491	.092	-.184	.166	-.145	-.003	.061	.063	.041	.206	.394	.328	.157
14	POPULATION_HEALTH	.786	2.821	.071	.060	.029	.339	-.435	.037	.028	-.058	-.032	.167	.096	-.125
15	FOCUS_BIN	.171	.377	.051	.261	-.316	-.044	-.011	.109	.027	-.078	.008	-.006	-.019	.115
16	FOCUS_HHI	.145	.114	.112	.335	-.310	-.028	.045	.025	-.059	-.188	-.022	.116	-.106	.207
17	FOCUS_Pmax	.242	.133	.110	.291	-.308	-.027	.055	.020	-.067	-.210	-.008	.064	-.128	.218
18	FOCUS_-J	-.777	.108	.121	.316	-.294	-.059	.040	.062	.010	-.137	.022	.092	-.081	.198
19	AVG_BREADTH	12.837	7.942	.089	-.295	.394	-.121	-.047	.055	.161	.556	.152	.561	.525	-.126

		Mean	S.d.	13	14	15	16	17	18	19
13	LOCATION	.597	.491	1						
14	POPULATION_HEALTH	.786	2.821	.252	1					
15	FOCUS_BIN	.171	.377	.103	-.092	1				
16	FOCUS_HHI	.145	.114	.107	-.063	.594	1			
17	FOCUS_Pmax	.242	.133	.101	-.114	.603	.956	1		
18	FOCUS_-J	-.777	.108	.156	-.013	.649	.920	.899	1	
19	AVG_BREADTH	12.837	7.942	.461	.120	-.122	-.348	-.378	-.205	1

VIF = 2.69 indicating multicollinearity to not be too much of an issue. Not all models showed signs of heteroscedasticity, but given that some models failed the Breuch-Pagan test, robust standard errors were ran on all the models. H1 posited that hospital focus will positively affect the experience of care, both a) patient experience and b) process of care. Out of the four measures of hospital focus, only the binary measure held a significant result for the direct path between hospital focus and patient experience. However, with none of the other measures supporting the hypothesis, H1a was not generally supported. With respect to process of care, HHI and max proportion measures showed marginal significance, and the negative evenness measure was significant. This indicates potential marginal support for H1b.

H2 posited that hospital focus would positively affect cost efficiency. Given the variable created was cost of care, restated, H2 posits that hospital focus would negatively affect costs. Only the binary variable supported this hypothesis. Thus, in general, H2 is not supported.

H3 posited that population health will positively affect the a) experience of care, and b) cost efficiency of the hospital. H3a was only marginally supported by the binary measure, with the remaining measures of hospital focus showing no significance, thus H3a was not supported. H3b was strongly supported in all regression equations. H4 posited that population health would negatively affect cost of care, and was generally not supported with no regressions showing significance.

H5 posited that breadth of services will have an inverted-U relationship with a) patient experience of care and b) process of care. Hypothesis 5a had strong results in the first stage of the regression with results losing significance with the introduction of the interaction effects in the second step of the regression. This provides support for H5a. H5b was not supported with no significant effects between average breadth and process of care.

Table 7: Regression results for patient experience[5]

PATIENT_EXPERIENCE	Model 1				Model 2			
	Binary	HHI	p_{max}	-J	Binary	HHI	p_{max}	-J
MIDWEST	3.549*	3.624**	3.552**	3.602**	3.638**	3.654**	3.693**	3.687**
	(.772)	(.777)	(.778)	(.775)	(.784)	(.781)	(.778)	(.779)
SOUTH	2.696**	2.707**	2.685**	2.662**	2.932**	3.019**	3.094**	2.974**
	(.730)	(.733)	(.733)	(.728)	(.726)	(.734)	(.734)	(.735)
WEST	.730	1.251*	1.204*	1.144*	1.513*	1.491*	1.574*	1.464*
	(.616)	(.604)	(.610)	(.611)	(.606)	(.612)	(.617)	(.621)
MEMBER	.478	.441	.447	.402	.485	.477	.572	.451
	(3.957)	(.530)	(.534)	(.532)	(.524)	(.528)	(.525)	(.532)
CMI	3.957*	3.039*	3.824**	3.238**	2.720^	3.097*	2.889*	2.932*
	(1.437)	(1.359)	(1.341)	(1.372)	(1.390)	(1.316)	(1.348)	(1.309)
MEDIUM	-2.792**	-2.768**	-2.820**	-2.740**	-2.751**	-2.817**	-2.734**	-2.776**
	(.798)	(.795)	(.801)	(.795)	(.788)	(.796)	(.790)	(.799)
LARGE	-3.239**	-3.229**	-3.217**	-3.168**	-3.199**	-3.176**	-3.188**	-3.182**
	(.966)	(.969)	(.972)	(.971)	(.971)	(.974)	(.976)	(.979)
TEACH	-1.558*	-1.465*	-1.511*	-1.445*	-1.445*	-1.313*	-1.389*	-1.295*
	(.685)	(.693)	(.691)	(.694)	(.710)	(.700)	(.717)	(.710)
OWNER	-2.979**	-3.048**	-2.964**	-3.336**	-3.477**	-3.245**	-3.121**	-3.215**
	(.704)	(.721)	(.706)	(.905)	(.682)	(.685)	(.696)	(.693)
LOCATION	-3.160**	-3.338**	-3.173**	-3.336**	-3.351**	-3.139**	-3.123**	-3.218**
	(.904)	(.905)	(.920)	(.905)	(.908)	(.905)	(.903)	(.909)
POPULATION_HEALTH	.166	.154^	.165^	.152^	.165^	.152	.129	.153^
	(.110)	(.109)	(.109)	(.109)	(.114)	(.111)	(.111)	(.111)
FOCUS	1.617	7.714	2.457	7.306^	**5.541***	.256	-3.855	2.564
	(1.746)	(6.021)	(4.243)	(5.283)	(2.010)	(8.166)	(4.593)	(5.199)
AVG_BREADTH	**-.275****	**-.188***	**-.281****	**-.213***	-.071	-.174^	**-.199***	-.152^
	(.100)	(.117)	(.107)	(.103)	(.121)	(.114)	(.109)	(.112)

[5] Note: Focus was measured three ways at the MDC level – binary, HHI, p_{max}, and -J

Table 7 (cont'd)

PATIENT_EXPERIENCE	Model 1				Model 2			
	Binary	HHI	p_{max}	-J	Binary	HHI	p_{max}	-J
AVG_BREADTH^2	**.022****	**.018***	**.022****	**.020***	.007	**.022***	.012	.016^
	(.008)	(.009)	(.009)	(.009)	(.010)	(.013)	(.011)	(.011)
FOCUS x AVG_BREADTH					.127	-.155	**-1.346****	-.441
					(.408)	(1.188)	(.628)	(.605)
FOCUS xAVG_BREADTH^2					**.129****	**.204****	.070	**.143****
					(.044)	(.112)	(.067)	(.068)
CONSTANT	13.155**	12.444**	13.017**	19.194**	12.044**	12.265**	13.681**	14.577**
	(2.017)	(2.349)	(2.295)	(4.334)	(2.020)	(2.343)	(2.335)	(4.514)
n	397	397	397	397	397	397	397	397
F (df)	9.62 (14)	9.67 (14)	9.67 (14)	9.53 (16)	13.29 (16)	13.95 (16)	11.68 (16)	12.39 (16)
Prob > F	.000	.000	.000	.000	.000	.000	.000	.000
R^2	.288	.292	.286	.291	.313	.309	.3131	.305

Note: ^ $p < .10$; * $p < .05$; ** $p < .01$

Table 8: Regression results for process of care[6]

PROCESS_OF_CARE	Model 1				Model 2			
	Binary	HHI	p_{max}	-J	Binary	HHI	p_{max}	-J
MIDWEST	2.074	2.360	2.327	2.280	2.350	2.362	2.393	2.298
	(1.784)	(1.785)	(1.789)	(1.787)	(1.781)	(1.786)	(1.784)	(1.777)
SOUTH	2.142	2.1753	2.041	2.034	2.276	1.860	1.907	1.871
	(1.899)	(1.869)	1.881	(1.880)	(1.880)	(1.868)	(1.888)	(1.892)
WEST	-1.306	-1.109	-1.197	-1.446	-1.172	-1.274	-1.268	-1.422
	(1.706)	(1.682)	(1.687)	(1.685)	(1.708)	(1.698)	(1.704)	(1.703)
MEMBER	4.583**	4.492**	4.493**	4.374**	4.676**	4.524**	4.646**	4.516**
	(1.308)	(1.307)	(1.311)	(1.312)	(1.307)	(1.315)	'(1.316)	(1.326)
CMI	3.992	.741	1.446	1.486	2.597	.608	1.343	1.271
	(3.172)	(3.385)	(3.345)	(3.251)	(3.189)	(3.357)	(3.383)	(3.273)
MEDIUM	.174	.306	.238	.383	.345	.394	.304	.406
	(1.960)	(1.966)	(1.967)	(1.966)	(1.972)	(1.977)	(1.975)	(1.977)
LARGE	1.006	1.017	1.070	1.207	1.291	.922	1.024	1.048
	(2.495)	(2.464)	(2.461)	(2.455)	(2.525)	(2.475)	(2.472)	(2.470)
TEACH	-2.148	-1.865	-1.871	-1.811	-1.612	-2.109	-2.105	-2.145
	(1.756)	(1.733)	(1.729)	(1.730)	(1.759)	(1.745)	(1.757)	(1.764)
OWNER	7.649**	7.358**	7.407**	7.343**	7.896**	7.676**	7.468**	7.465**
	(2.010)	(1.991)	(1.998)	(1.995)	(2.040)	(1.998)	(1.983)	(1.986)
LOCATION	.272	-.396	-.316	-.361	-.008	-.619	-.420	-.589
	(2.154)	(2.163)	(2.174)	(2.148)	(2.192)	(2.164)	(2.181)	(2.155)
POPULATION_HEALTH	**.680***	**.645***	**.690****	**.640***	**.607***	**.646***	**.664***	**.630***
	(.299)	(.296)	(.293)	(.296)	(.299)	(.295)	(.297)	(.298)
FOCUS	3.431	**24.641***	**18.180***	**22.551***	-3.389	24.468^	14.064^	20.875*
	(4.541)	(12.421)	(9.637)	(11.548)	(4.798)	(18.094)	(10.345)	(11.466)
AVG_BREADTH	.222	**.559***	**.463***	.464^	.460^	.507^	.434^	.509^
	(.277)	(.310)	(.295)	(.283)	(.328)	(.310)	(.306)	(.312)

[6] Note: Focus was measured three ways at the MDC level – binary, HHI, p_{max}, and -J

Table 8 (cont'd)

PROCESS_OF_CARE	Model 1				Model 2			
	Binary	HHI	p_{max}	-J	Binary	HHI	p_{max}	-J
AVG_BREADTH^2	-.011	-.026	-.021	-.020	-.029	-.042^	-.038^	-.032
	(.021)	(.022)	(.021)	(.020)	(.025)	(.028)	(.027)	(.026)
FOCUS x AVG_BREADTH					**-1.758***	-1.418	-1.387	-1.344
					(.840)	(2.375)	(1.333)	(1.364)
FOCUS xAVG_BREADTH^2					-.081	**-.375***	-.193	-.219
					(.111)	(.217)	(-.193)	(.170)
CONSTANT	28.766**	26.086**	25.729**	47.037	27.199**	28.032**	27.681**	45.84**
	(4.972)	(5.079)	(5.257)	(9.741)	(5.089)	(5.519)	(5.403)	(10.327)
n	397	397	397	397	397	397	397	397
F (df)	4.22 (14)	4.40 (14)	4.52 (14)	4.38 (14)	4.11 (16)	5.27 (16)	4.37 (16)	4.21 (16)
Prob > F	.000	.000	.000	.000	.000	.000	.000	.000
R^2	.138	.147	.145	.146	.146	.154	.149	.15

Note: ^ $p < .10$; * $p < .05$; ** $p < .01$

Table 9: Regression results for cost of care[7]

COST_OF_CARE	Model 1				Model 2			
	Binary	HHI	p_{max}	-J	Binary	HHI	p_{max}	-J
MIDWEST	**-.035***	**-.035***	**-.035***	**-.035***	**-.038***	**-.041***	**-.040***	**-.040***
	(.017)	(.017)	(.017)	(.017)	(.017)	(.017)	(.017)	(.017)
SOUTH	-.011	-.011	-.011	-.011	-.018	-.020	-.023	-.021
	(.017)	(.017)	(.017)	(.017)	(.019)	(.018)	(.018)	(.019)
WEST	-.061**	-.060**	-.060**	-.060**	-.070**	-.069**	-.071**	-.071**
	(.015)	(.015)	(.015)	(.016)	(.015)	(.015)	(.015)	(.016)
MEMBER	-.005	-.005	-.005	-.005	-.003	-.002	-.003	-.004
	(.013)	(.013)	(.012)	(.012)	(.012)	(.012)	(.013)	(.012)
CMI	.013	.007	.005	.010	.058	.043	.051	.042
	(.077)	(.073)	(.076)	(.077)	(.067)	(.062)	(.064)	(.068)
MEDIUM	.034*	.034*	.034*	.033*	.029	.028	.028	.030*
	(.015)	(.015)	(.015)	(.015)	(.014)	(.015)	(.015)	(.015)
LARGE	.044*	.040*	.039*	.040	.036	.026	.030	.033
	(.018)	(.019)	(.019)	(.018)	(.018)	(.019)	(.019)	(.018)
TEACH	.014	.013	.013	.013	.008	.000	.000	.003
	(.014)	(.014)	(.014)	(.015)	(.015)	(.014)	(.014)	(.014)
OWNER	.026	.024	.023	.024	.036	.025	.024	.026
	(.025)	(.026)	(.026)	(.025)	(.026)	(.026)	(.026)	(.025)
LOCATION	.050*	.046*	.045*	.047*	.052*	.034	.039	.040^
	(.020)	(.022)	(.022)	(.021)	(.019)	(.022)	(.022)	(.021)
POPULATION_HEALTH	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.002
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
FOCUS	-.051	-.007	.008	-.028	**-.147***	.148	.090	.139
	(.072)	(.249)	(.162)	(.232)	(.087)	(.183)	(.116)	(.143)
AVG_BREADTH	**.011****	**.013****	**.013****	**.013****	**.008***	**.012****	**.011****	**.011****
	(.004)	(.005)	(.004)	(.004)	(.005)	(.004)	(.004)	(.005)

[7] Note: Focus was measured three ways at the MDC level – binary, HHI, p_{max}, and -J

Table 9 (cont'd)

COST_OF_CARE	Model 1				Model 2			
	Binary	HHI	p_{max}	-J	Binary	HHI	p_{max}	-J
AVG_BREADTH^2	**-.001***	**-.001***	**-.001***	**-.001***	**-.001***	**-.002****	**-.001****	**-.001****
	(.000)	(.000)	(.000)	(.000)	(.000)	(.001)	(.000)	(.000)
FOCUS x AVG_BREADTH					-.012	-.026	-.001	.003
					(.010)	(.029)	(.015)	(.021)
FOCUS x AVG_BREADTH^2					**-.004***	**-.009***	**-.005***	**-.005***
					(.002)	(.005)	(.003)	(.003)
CONSTANT	.769**	.762**	.759**	.739**	.756**	.751**	.746**	.864**
	(.096)	(.104)	(.104)	(.198)	(.091)	(.081)	(.087)	(.149)
n	404	404	404	404	404	404	404	404
F (df)	9.31 (4)	8.31 (14)	8.32 (14)	8.41(14)	8.39 (16)	8.00 (16)	8.16 (16)	7.82 (16)
Prob > F	.000	.000	.000	.000	.000	.000	.000	.000
R2	.333	.333	.333	.333	.367	.363	.362	.355

Note: ^ $p < .10$; * $p < .05$; ** $p < .01$

H6 posited that the breadth of care would affect cost of care in a curvilinear fashion. This was strongly supported with all regressions showing significant, this H6 was supported. H6 stated that breadth of clinical service offerings will have an inverted-U relationship with cost of care – i.e. breadth will increase cost of care but at a diminishing rate. H6 was supported with all measures of breadth showing an inverse-U relationship with cost of care. H7 – H9 posited that focus, through an interaction with breath, would improve upon the relationships between breadth of services and patient experience, process of care, and cost of care; respectively. H7 was not supported with only one measure – HHI – showing significance. H6 shows strong significance between the interaction of focus and breadth upon patient experience with the exception of the p_{max} measure of hospital focus. The results show that patient experience grows at a quadratic rate with respect to breadth, such that patient experience is greater for higher levels of focus. H8 also has strong support, however, much more difficult to interpret. Looking at Figure 4, at lower level of focus the cost of care curve is higher (i.e. less cost efficient) than when focus is high. Similar curves exist when looking at the other measurement forms of hospital focus.

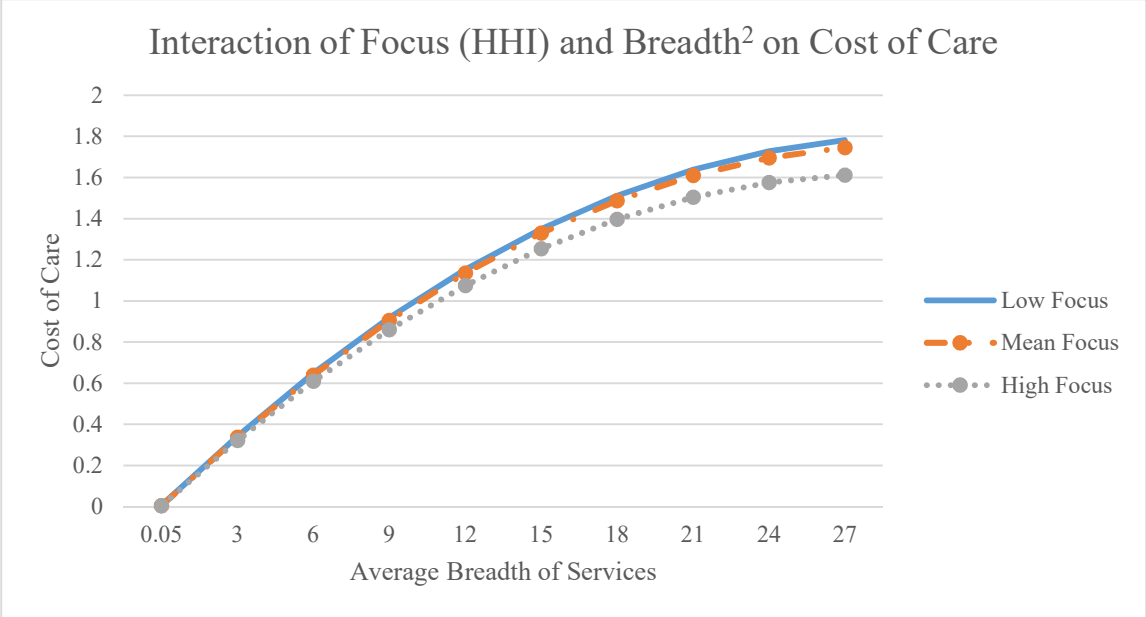


Figure 4: Interaction of focus and average breath squared on cost of care

3.5 Discussion

This study attempted to look at the effects of focus and breadth simultaneously. While typically thought to be opposites, instead, in a limited manner, it was shown that the two work together to achieve improved outcomes. In the case of the Triple Aim, it can be shown that through increased focus that the increased cost associated with breadth of services, albeit a diminishing cost, has the ability to decrease costs at a faster rate than if a hospital does not focus. Similarly, there is little difference in cost benefit when breadth of services are low. This is probably due to a limitation on the economies of scale and scope able to be achieve through the limiting of services. Additionally, it was noticed that the effect of breadth and focus on patient care were both significant, until the introduction of the interaction effects. After this, the two, once again in tandem worked together to improve the patient experience. This potentially poses an interesting question to managers: 1) how many services are enough, and 2) does the difference in the marginal cost for supporting such services enable improved performance through the increase in patient experience? These particular questions lend themselves to extend this research either via an optimization model to identify the ideal degree of focus and breadth; and into the marketing domain to understand how focus and breath can influence the future positioning of the hospital in a given market.

Within the results, there are several areas of note. In particular, outside of the interaction effects with average breadth, focus did not have much of an impact on Triple Aim performance. Similarly, the trade-off between patient experience and cost of care may not be as drastic as previously thought. The marginal benefits of increased breadth takes the form:

$$\frac{d(Patient\ Experience)}{dBreadth} = 2 * c_1 * focus * breadth$$

where values of 'c' are the estimated regression coefficients. The marginal effect for cost takes the form:

$$\frac{d(cost)}{dBreadth} = c_2 - 2 * c_3 * breadth - 2 * c_4 * focus * breadth$$

Given the marginal values, the benefit is highest for high levels of focus and breadth; and similarly, costs are lower for hospitals that either have low breadth or have high levels of breadth and focus. However, the issue lies in the constant (c_2) in the second equation. As each marginal unit of breadth increases, the hospital must first overcome that cost. This shows that many hospitals will still see increasing cost when adding services will have a more difficult time overcoming the costs; however, eventually economies of scope should start to lower the costs. Additionally the marginal value for patient experience in low breadth firms can be mitigated by the focus. Thus there are synergies that can be had by both focusing and increasing service offerings; however, there is a cost hurdle that the hospitals will first have to overcome.

In addition to the testing of the theoretical model, this study provides a comprehensive evaluation of focus using multiple measures and complete hospital data. Unlike previous works, in this study each hospital had a complete representation of their population through the sample provided by NIS. This additionally allowed for greater generalization of the results than previous studies that emphasized specific clinical areas or used limited patient populations (i.e. CMS patients). Through the analysis it appears that many of the proportional/concentration measures used in the past tend to confirm many of the issues presented in previous literature. While negative evenness is a more theoretically sound measure of focus, there were no discernable differences in outcome estimation when utilizing the existing literature measure. However, one noticeable difference was in the pairwise correlations; the relationship, primarily due to mathematical

reasons, show that the negative evenness measure for focus was less correlated to breadth than any other focus measure. This may be an opportunity in the future for a numerical analysis and measurement development piece to take shape, and may make this measure better suited for understanding how focus (i.e. exploitation) and breadth (exploration) work in tandem.

When looking at the results, the binary measure of focus stuck out. Given that the measure equals one only when a hospital services four or less MDCs, it could be said that these hospitals are "highly focused" hospitals. Looking at the results, the effects of focus tend to be more drastic with the focus variable strongly positively influencing patient experience and reducing cost of care. This remains consistent with the expectations from the original Skinner (1974) and Porter (1985) definitions. However when looking at the more service oriented measures based in the ecology literature,

3.6 Limitations

One of the main limitations is the time gap in data. Ideally, it would have been better to lag by a year and then attempt to lag by more years as needed to see if there were multiyear effects. However, due to the newness of the outcome measures this created an issue. When combined with the change in the NIS survey in 2012, the data necessary to calculate focus is limited to 2011 and earlier. It potentially would be useful to seek out addition data sources for the focus construct, perhaps CMS records or a disaggregation of records to get estimated hospital usage similar to what was done by Ding (2014). Additionally, recently new measures have been created by CMS to measure the experiences of care. In the future, the usage of the "Outcomes" measure might be more beneficial than the process of care measure.

CHAPTER 4 – Effects of Hospital Focus and Horizontal Integration on Hospital Performance: A Relational View

4.1 Motivation

"The healthcare industry represents an important and growing research context that can be characterized by an intense focus on providing individualized offerings and a recognized need for collaboration among a number of decentralized supply chain actors (Boyer & Pronovost, 2010; de Blok et al., 2013)," (Dobrzykowski et al., 2014, p. 514).

The ability to provide care within a hospital is dependent upon the resources at the disposal of the hospital. The previous essays attempted to look at the antecedents and benefits of focus, while showing that breadth plays a role in the ability of focus to meet specific performance needs. However, the ability of a hospital to expand its product service offerings (i.e. increase breadth) is not always feasible. Consequently, if a hospital is to leverage additional skill sets and knowledge bases, external integrations potentially provide that opportunity. This has resulted in hospitals expanding beyond their walls to find the means of meeting the needs of their population (Bisognano & Kenney, 2012)

The hospital literature has noted that the number of "solo" hospitals have been declining (Cuellar & Gertler, 2003). With the passage of the Affordable Care Act and bundled payments there has also been a large amount of consolidation within the hospital industry (Cutler & Scott Morton, 2013). These consolidations, represent the ultimate in horizontal integration – a merger between two or more entities. However, consolidation and mergers are not the only forms of horizontal integration taking place within the hospital industry. We can also see alliances forming between hospitals. The Mayo Clinic recently developed their "AskMayoExpert" toolset that allows

partner hospitals to leverage the knowledgebase of the Mayo Clinic (Noseworthy, 2014). "[R]ather than engage in extensive consolidations of organizations (e.g. megers and acquisitions), Mayo is pursuing a business model based on the diffusion of knowledge as a practice integration tool to improve efficiency and safety of medical care," (Noseworthy, 2014, p. 441).

While the previous essay looked at how focus and breadth can work toward performance based outcomes, these forms of partnerships tend to extend the concept of breadth outside the firm, when viewed through the lens of the relational view of the firm (Dyer & Singh, 1998). Thus evaluating the potential benefits of these partnerships can provide additional insights into how hospital focus influences performance-based outcomes in tandem with integration.

4.2 Literature Review – Understanding Integration

The concept of integration between two firms was best formalized by Porter (1985), who identified that integration could have both vertical and horizontal linkages. The vertical linkages were associated with the value chain activities (e.g. production) allowing for the execution of activities required to move and transform products and services from suppliers through to customers (Swink et al., 2007). The horizontal linkages were originally associated with those activities existing at the same level within the value chain to aid in the production of products or services, traditionally from an internal perspective (Dobrzykowski et al., 2016; Swink et al., 2007; Vickery et al., 2003), however more so looking externally (e.g. Fottler et al., 1982; Raue & Wieland, 2015; Riccobono et al., 2014). In Figure 5, the distinction between the various directions of vertical (i.e. suppliers and customer), horizontal (competitors and complementors), and internal integration are shown pictorially.

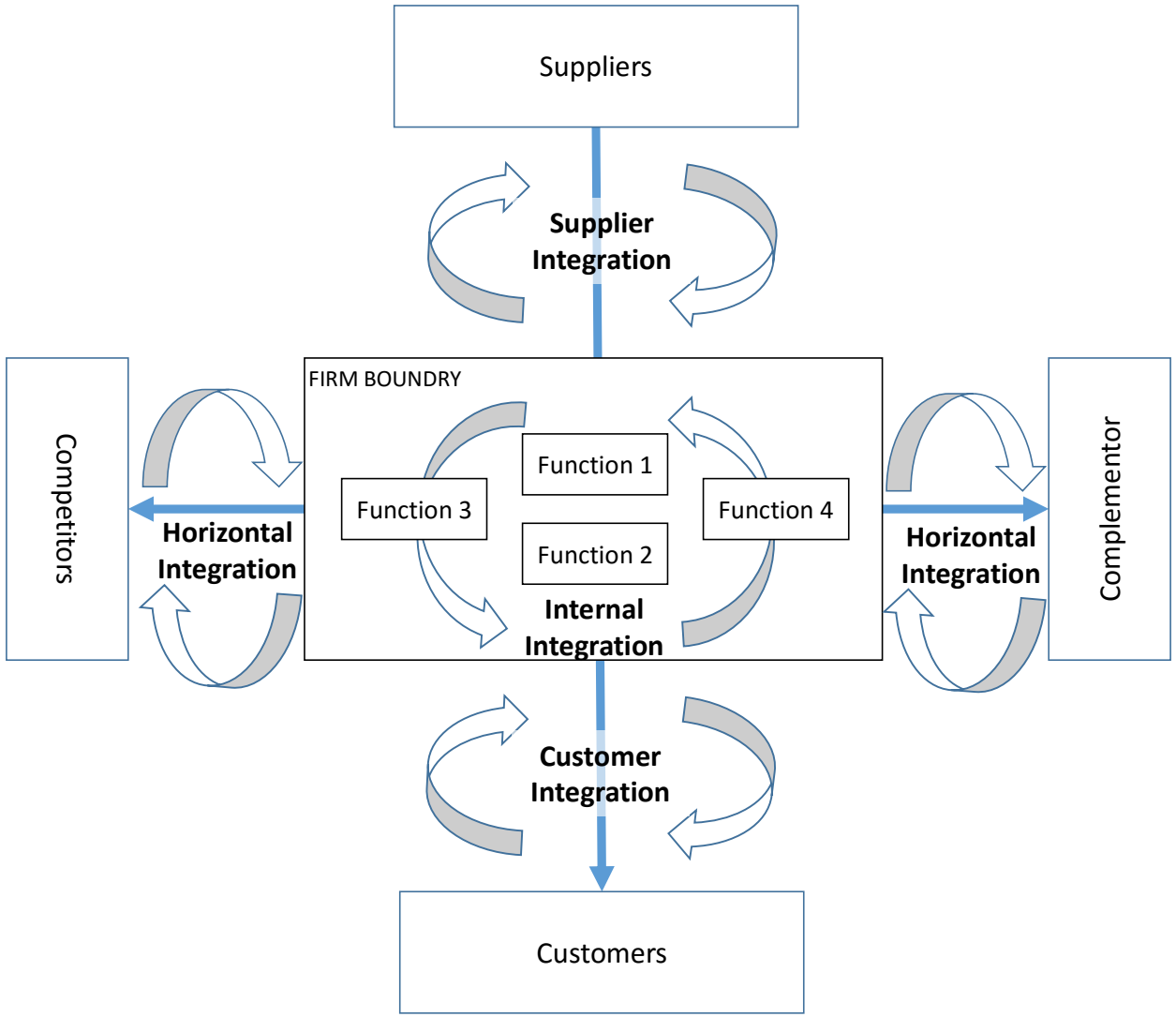


Figure 5: Directionality of integration

Table 10: Dimensions of measured integration from recent and seminal empirical papers

Author/s (Year)	Journal	Dimensions of Integration
Dobrzykowski et al. (2016)	JOM	Communication, coordination, teamwork
Flynn et al. (2010)		Information sharing, resource sharing, participation
Jayaram et al. (2010)	IJPR	Information sharing, Inter-organizational decision making, Proactive planning with supply chain members
Leuschner et al. (2013)	JSCM	Sharing information, Operational integration, Relational integration
Narasimhan and Kim (2002)	JOM	Information exchange/availability, strategic relationship, participation/coordination
Schoenherr and Swink (2012)	JOM	Close collaboration, information sharing, coordination, process synchronization

When looking at integration, the operations management and supply chain literature the seminal piece by Frohlich and Westbrook (2001) discussed the extent of integration up and down the supply chain, which they referred to as "arcs." Through their discussion depth of integration through the various levels of integration showed the potential for improved performance. Through the development of the literature this has led to integration being defined as the "extent to which the organization is connected and strategically aligned with its partners (Das et al., 2006; Jayaram et al., 2010)," (Dobrzykowski et al., 2016). This strategic alignment is meant to allow the focal firm to leverage their relationships for some form of rent (e.g. improve performance) that otherwise would not be attainable (Dyer & Singh, 1998).

In addition to directions of integration (i.e. vertical vs. horizontal), authors have identified that there are various dimensions to integration. In Table 10, a review of key literature was performed with identification of measures from the text or summarization of the latent variables

presented. Based upon the review and for the purposes of this dissertation, integration is reflected in the 1) extent of communication/information sharing, 2) the extent of process coordination, and 3) the extent of collaboration towards a common strategic goal.

The vertical dimension of integration, commonly referred to as supply chain integration (SCI), is the degree to which a focal firm "strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational process," such that the goal is to "achieve efficient flows of products and services, information, money, and decisions to provide maximum value to the customer at low cost and speed," (Flynn et al., 2010, p. 59). Through supply chain integration the focal firm gains information and insight into market expectations and opportunities from the customer side (Schoenherr & Swink, 2012; Wong et al., 2011) and the processes, capabilities, and constraints on the supplier side (Ragatz et al., 2002; Schoenherr & Swink, 2012). While complete integration may result in a "vertical integration," or acquisition of a supply chain partner, high levels of integration will typically result in the blurring of the firm boundary with immediate suppliers and customers becoming embedded within teams at the focal firm. However, supply chain integration has costs associated with the management and governance of the relationships. While there is potential for strategic benefits (Frohlich & Westbrook, 2001; Jayaram et al., 2010; Vickery et al., 2003), supply chain integration does not guarantee improved performance (Jayaram et al., 2010).

Horizontal integration has slowly started to be recognized as a source of additional competitive advantage in providing addition value to the supply chain. In its basic definition, horizontal integration occurs when competing organizations at the same level of the value chain – in the case of this dissertation, two or more hospitals – form an association or alliance to share resources (Soosay et al., 2008). From an internal perspective horizontal integration is commonly

referred to as internal integration, and is conceptually the ability of the firm to work across departmental boundaries (Vickery et al., 2003). Firms with high levels of internal horizontal integration are seen having high levels of cross-functional teaming (Teixeira et al., 2012). This allows for specialization within the functional silo (i.e. operational unit), while allowing for broader knowledge base (Teixeira et al., 2012) and skill set to be utilized across the silo wall to allow for a greater response to customer needs (Vickery et al., 2003). From an external perspective, horizontal integration is commonly referred to as an alliance or collaboration. Horizontal integration exploits linkages within the same level of a firm's value chain (i.e. at the same level in the supply chain) whereas vertical integration exploits the linkages between the firm's value chain and that of its suppliers and customers (Porter, 1985; Vickery et al., 2003). The literature emphasizes that the horizontal dimension of integration is related to the number of services, markets, and products offered (McLaughlin et al., 1995) by firms existing within the same level of the supply chain (Caputo & Mininno, 1996). These strategic alliances provide the ability to enhance resource bundles/offerings when the capabilities inside the firm are not enough to achieve the desired outcome (Harrison et al., 2001; Hoskisson & Busenitz, 2002). The firms horizontally integrated, who will be competitors or complementors, through the relationship can provide additional capabilities via the pooling of resources enabling either scale (vis-à-vis competitors) or scope (vis-à-vis complementors). Teece noted that this "joint production can proceed in the absence of multi-product organization if [contractual] mechanisms can be devised to share the inputs which are yielding the scope economies," (Teece, 1982, p. 40). Hence, similar to vertical integration, horizontal integration have costs associated to the integration and do not guarantee success.

4.3 Conceptual Model

The resource based view (RBV) identifies that capabilities utilized by a firm (i.e. hospital) must be of valuable, rare, inimitable and not easily substituted for the firm to achieve superior rents (Barney 1991). Such capability can be tangible or intangible in nature, and include organizational processes and routines (Barney 2001) indicative of hospital focus. Through the hospital focusing on a specific set of specialties, the firm has the ability to differentiate itself from the competition via economies of scope, thereby creating a set of skills unique to the focused hospital (McLaughlin, Yang, and van Dierdonck 1995); this should result in superior rents, or in the case of a hospital, superior outcomes. The operations and management literature supports this claim identifying that focus allows for improved performance at lower cost creating a competitive advantage for the focal firm (Skinner 1974; Porter 1985). By focusing on a set of conditions (e.g. cardiology) that the hospital should see improved costs (Ding 2014; McDermott and Stock 2011), reduced mortality rate (KC and Terwiesch 2011; Clark and Huckman 2012), reduced length of stay (KC and Terwiesch 2011), and a reduction of hospital readmissions (Ding 2015). Most of these examples identify, in essence, that quality outcomes related to the focal area and the associated costs are reduced. Given the past literature, the following baseline hypotheses are posited:

Hypothesis 1 (H1): Hospital focus will positively affect experience of care.
Hypothesis 2 (H2): Hospital focus will negatively affect cost of care (i.e. reduce costs).

Nevertheless, Skinner (1974) supposed "a factory cannot perform well on every yardstick," (p.115). While it is expected that a focused hospital may "cherry-pick" by attracting patients (KC & Terwiesch, 2011) this does not mean that the serviceability aspect of the hospital will be able to

keep up with the patient needs as focus is further increased. Similarly, with the desire to improve the population health a focused hospital will typically be limited in the set of conditions it can treat with superior quality.

Hypothesis 3 (H3): Hospital focus will not affect population health.

Based upon the focus literature, focus aligns the firm towards a single end (Porter, 1980; Skinner, 1974). This alignment should drive resources to internally align towards the focused services, and provides the possibility and is encouraged to internally integrate. Heskett (1986), utilizing the case of Shouldice Hospital, identified that the hospital focused on external hernia surgery required integration of strategy and systems across the hospital to see the benefits. This enables the following:

Hypothesis 4 (H4): Hospital focus will positively affect internal integration.

However the decision to focus limits the ability of the firm to react to market conditions, especially if the market is dynamic in nature (Hayes & Wheelwright, 1984). Through the building of relationships with hospitals either via partnership or alliance the hospital has further relational assets at its disposal. As an example, partnership with the Mayo Clinic enables the partner hospitals the ability to access and leverage the knowledge based resources unique to the Mayo Clinic (Noseworthy, 2014). The additional access to these resources provides a competitive advantage that hospitals outside of that partnership are less likely to attain, and even then, with less success as a result of the uniqueness created through the partnership. In order for the hospital to meet the

needs of a changing patient population, either a reduction in focus vis-à-vis the expansion of services must occur, or leveraging complementary firms becomes necessary. Thus, it is expected:

Hypothesis 5 (H5): Hospital focus will positively affect external horizontal integration.

From the perspective of the relational view of the firm (Dyer & Singh, 1998), the interfirm relationships can themselves be a source or leveraging additional rent. In the case of a hospital, horizontal integration enables firms to increase scale and expand opportunities via synergies (Thaldorf & Liberman, 2007). Under the focus strategy, the firm has proactively chosen to limit its potential to provide care to a select group within the entire patient population, leaving gaps in their ability to meet the needs of all patients. Given this, it is expected that external integration should help increase the amount of care provided and the efficiency of the care provided through the pooling and coordination of resources; similar to the collaboration across the hospital silos enables the hospital to remediate additional patient illnesses as well, thus:

Hypothesis 6 (H6): Hospital internal integration will positively affect population health

Hypothesis 7 (H7): External horizontal integration will positively affect population health.

Similarly, both forms (internal and external) of horizontal integration should provide greater capabilities for treating conditions outside of the focal area of the respective department (internal) or hospital (external). These additional capabilities (i.e. clinical areas/services) should enable an increased ability to provide care; potentially enabling the ability for each horizontal entity (either department or hospital) to specialize on a specific clinical area themselves. Thus:

Hypothesis 8 (H8): Internal horizontal integration will positively affect experience of care.

Hypothesis 9 (H9): External horizontal integration will positively affect experience of care.

However, integration has costs associated with collaboration. Internal horizontal integration has been identified in the focus literature to allow for greater alignment of goals associated with the focal area (McDermott & Stock, 2011); however, governance necessary for the management of the external horizontal entities can eventually outweigh the benefits obtained, thus:

Hypothesis 10 (H10): Internal horizontal integration will negatively affect cost of care (i.e. decrease costs).

Hypothesis 11 (H11): External horizontal integration will positively affect cost of care (i.e. increase costs).

4.4 Data Collection

4.4.1 Survey Collection

Data was collected via a survey utilizing latent construct item measures. The research frame focused upon gaining a minimum of one response per hospital. Hospital executives were chosen to complete the survey due to their overarching understanding of the hospital's strategy and the appropriateness of this knowledge toward their ability to provide accurate responses to the survey (Starbuck & Mezias, 1996).

Given the recent difficulty with getting responses for survey based research, questions for this survey were incorporated into a larger research project at Michigan State University, and was administered by a market research firm, Altarum. Altarum purchased email lists of hospital executives from a reliable vendor and administered the survey. Three waves of email campaigns

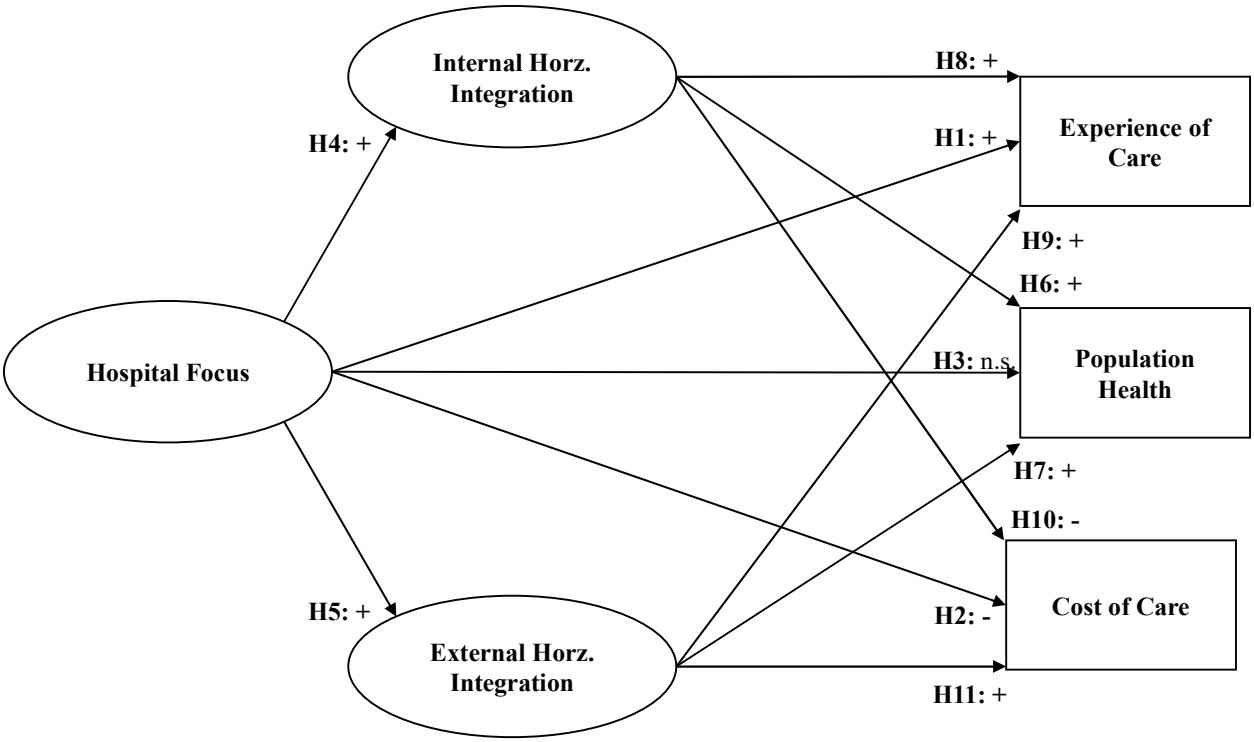


Figure 6: Hypothesized structural model

occurred with multiple reminder emails sent to each potential participant encouraging them to participate in our online survey. Emails were sent to approximately 36,144 email address with roughly half of those emails providing either hard (i.e. email not valid) or soft (e.g. this email box is full) bounce back. Of those that were contacted 644 respondents accessed the online survey with 67 of those respondents opening the survey, but not starting it; 346 starting the survey, but not completing it; and 230 respondents completing the survey such that 90% of the questions were completed. While noted that market research/panel research tend to have low or indeterminable response rates (Schoenherr et al., 2015), the completion rate for firms was similar to response rates seen in the literature. Based upon those that opened the internet based survey, the completion rate was 35.8%. Additionally, each respondent represented one hospital. With an estimated[8] 5,627

[8] http://www.aha.org/research/rc/stat-studies/fast-facts.shtml

registered hospitals in the country, the sample represents 4.1% of the U.S. hospital industry.

Using procedures similar to other supply chain researchers utilizing market research/panel data firms, respondents to the survey were asked to verify employment information regarding title, hospital, location, and CMS number (if applicable). This was done to verify that the respondent was in a position that would have intimate knowledge of the hospital's overall strategy, partnerships, and performance.

4.4.2 Survey Instrument and Measurement

The survey was developed primarily through the adoption of existing measure with modifications made for the hospital environment when possible. A few measures were developed to reflect conceptual ideas that had well defined measurement concepts. After adoption of the measures to the hospital context, survey items were evaluated by members of the hospital industry that served in executive roles to check for face validity; several refinements were made. Measures that were found to be inconsistent with concepts in the hospital/healthcare were either removed or modified to add clarity to the concept.

Survey respondents were asked to identify their level of agreement for items on the survey were measured in a seven point Likert scale where 1 = strongly disagree and 7 = strongly agree. To help reduce the potential for common method bias, latent variables we placed on separate web pages and placement of questions were done in a manner to help reduce common method bias (Podsakoff et al., 2003). The hospital service focus construct was adopted from Skaggs and Huffman (2003) due to its ability to incorporate both types of focus strategies into the measure – market differentiation and specialization (Porter, 1980; Skinner, 1974). The integration measures – internal horizontal integration, external horizontal integration, supplier integration, and customer

integration – were adopted from Dobrzykowski et al. (2016), Flynn et al. (2010), Narasimhan and Kim (2002), and Schoenherr and Swink (2012) in a manner that comprehensively enveloped the coordination, collaboration, and communication aspects of integration. These measures were then modified to reflect their type of integration, their direction of integration (vertical vs. horizontal) and their orientation (internal vs. external). The dependent Triple Aim latent variables – cost efficiency, experience of care, and population health – were developed from the white paper by Stiefel and Nolan (2012) that complemented the seminal paper by Berwick et al. (2008). This utilized "Appendix B: Detail on the Menu of Triple Aim Outcome Measures and Glossary of Data Sources," from Stiefel and Nolan (2012). These measures were made into composite scores do to the varying content in their measures. The cost of care measure was developed by taking the negative of cost efficiency.

4.4.3 Controls

In order to control for the complexity of cases, case mix index (CMI) was pulled from CMS to be used as a control. Given the time lag in most secondary data, the CMI is one of the most recently updated measures. This measure additionally provides insight into the complexity of the Medicare/Medicaid patients a hospital may see. Given that complexity of cases can influence the many of the measures, it was controlled for. Additionally, size was controlled for; however, non-traditionally, by the number of nurses at the given hospital. This information was provided via the survey instrument.

4.5 Results

Due to the nature of the latent variable constructs and the complex nature of the model, structural equations modeling (SEM) was utilized. Following the Anderson and Gerbing (1988) recommendations for SEM, a two staged approach was utilized. First the model was assessed for quality of the measurement through a confirmatory factor analysis (CFA). The CFA assessed the proper factor loading on their latent constructs, proper convergent and divergent validity, and estimated reliability of the constructs. After the assessment of the CFA, the second-step assessed the quality of structural model against the data and allowed for the testing of the research hypothesis. Stata version 12.1 was used for the analysis of the model (Acock, 2013). Given the randomly missing item measures, a fixed information maximum likelihood (FIML) was utilized through Stata's maximum likelihood missing variables (MLVL) functionality (StataCorp, 2011). Model fit for both the CFA and the structural model were assessed utilizing the fit indices recommended by Hu and Bentler (1999). However, the SRMR could not be estimated due to the usage of the FIML.

4.5.1 Confirmatory Factor Analysis

The measurement model consisted of three multi-measure latent constructs (hospital focus, internal integration, horizontal integration), three composite score indices (cost of care, experience of care, and population health), and the control of CMI. With the exception of $X^2 = 129.97$, df =

Table 11: Latent variable factor loadings

Items: Measured degree of agreement with item on 7-point scale. (1 - Strongly Disagree, 7 - Strongly Agree)		Mean	SD	CFA Loading	z-Value
Hospital Focus (ξ_1)	CR = .89; AVE = .73				
HSF_1	Relative to other hospitals, our hospital primarily provides specialized care	3.61	2.11	.84	30.50
HSF_2	Relative to other hospitals, our hospital provides services that focus on a specific specialty or specialty area	4.66	1.92	.91	40.30
HSF_3	Relative to other hospitals, our hospital provides services that focus on a specific type of patient	3.41	1.89	.80	27.95
Internal Horizontal Integration (η_2)	CR = .90; AVE = .75				
I_INTG3	Our hospital has high levels of communication across internal functions and departments	4.45	1.47	.83	30.59
I_INTG4	Our hospital's internal functions and department teams effectively coordinate to deliver patient care	4.85	1.40	.94	46.78
I_INTG5	Our hospital's internal functions and departments have a common roadmap/procedures to guide patient care	4.52	1.48	.81	29.56
External Horizontal Integration (η_3)	CR = .98; AVE=.91				
EH_INTG1	Representatives from these hospitals participate as members of our patient care teams	.83	1.78	.92	90.32
EH_INTG3	These hospitals [we partner or affiliate with] have high levels of communication with our hospital.	.84	1.71	.97	216.95
EH_INTG4	These hospitals [we partner or affiliate with] effectively coordinate with our hospital to deliver patient care	.89	1.81	.99	318.41
EH_INTG5	Our hospital collaborates with these hospitals to leverage combined competencies/specialties in order to optimize patient care	1.03	2.11	.93	96.18

Table 12: Covariance between CFA elements

		1	2	3	4	5	6	7	8
1	CMI	1							
2	# of Nurses	.389**	1						
3	Experience of Care	-.022	-.117^	1					
4	Population Health	.223**	.106	.231**	1				
5	Cost of Care	.141^	-.039	-.238**	.069	1			
6	Internal Horz. Integ.	.086	-.021	.444**	.164*	-.105	1		
7	External Horz. Integ.	.060	.041	.069	.137*	.028	.079	1	
8	Hospital Focus	.398**	.131	.086	.097	-.012	.218**	.025	1

73, p =.000 being statistically significant; the model showed acceptable fit with RMSEA = .058 [90% CI: .042, .074], and CFI = .98 (Hu & Bentler, 1999). Given chi-square is a measure susceptible to larger sample sizes and model complexity, the fit of other measures indicates the model as an acceptable level of fit. In addition to model fit, the standardized factor loadings were significant ($p < .01$) and greater than the recommended .50 level (Bagozzi & Yi, 1988, 2012) – See Table 11.

Construct validity and reliability was also deemed to be within acceptable ranges. Based upon the recommendations of Fornell and Larcker (1981), the square root of the average variance extracted (AVE) was greater than all the estimated latent factor covariances indicating acceptable discriminate validity. Additionally, all factors had AVE greater than the recommended .50 level indicating that convergent validity was present. Estimated reliability, based upon composite reliability, was above the recommended .70 threshold (Bagozzi & Yi, 2012).

4.5.2 Structural Model

The hypothesized structural model controlled for CMI and number of nurses, and demonstrated good overall fit ($X^2 = 129.97$, df = 73; p-value = .00; RMSEA = .058 [90% CI: .042, .074]; CFI =

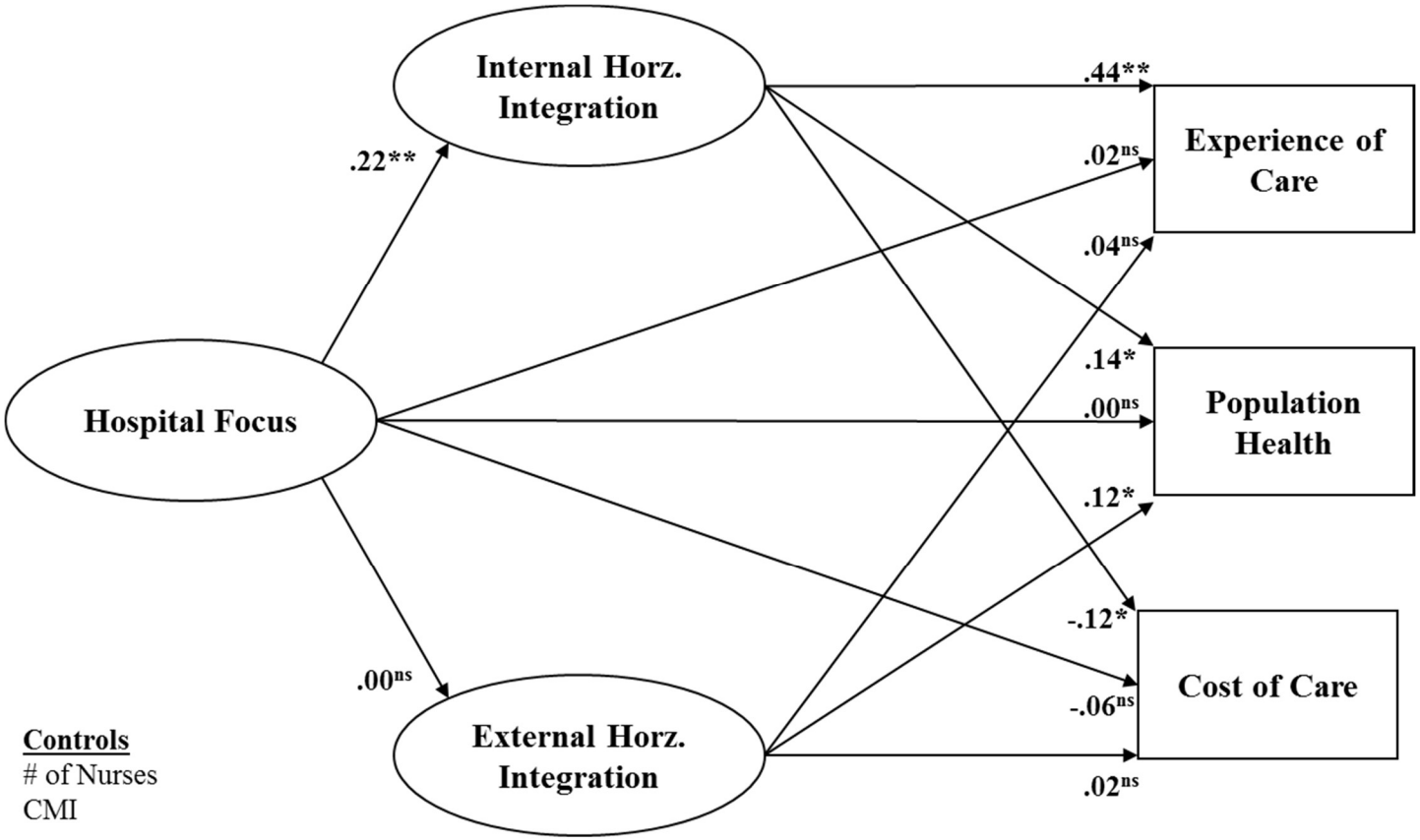
.98)[9]. Figure 7 shows the results with the standardized values. Given the theoretical linkages, co-varying paths were placed between population health and cost of care, as well as experience care and cost of care (Berwick et al., 2008). The paths from hospital focus to experience of care (.02, ns), cost of care (.00, ns), and population health (.00, ns), were not significant, resulting in no support for H1 through H3, respectively. The path from hospital focus to internal horizontal integration (.22, $p < .01$) was significant, supporting H4; however the path from hospital focus to external horizontal integration (.00, ns) was not significant resulting no support for H5. The paths from internal horizontal integration to population health (.14, $p < .05$), experience of care (.44, $p < .01$), and cost of care (-.12, $p < .05$) were significant yielding support for H6, H8, and H10 respectively. Lastly the path from external horizontal integration to population health (.12, p< 05) was significant supporting H7; however the paths to experience of care (.04, ns) and cost of care (.02, ns) were not significant resulting in no support for H9 and H11, respectively.

Given the nature of the model lending itself to mediation of hospital focus via internal integration, mediation effects were tested utilizing the Sobel test (Kaplan, 2009; Sobel, 1982). Hospital focus through internal integration to the three measures of the Triple Aim were evaluated. The Sobel test resulted in significant effects for experience of care showing indirect effects of focus on experience of care vis-à-vis internal horizontal integration.

4.5.3 Robustness Checks

Given the lack of direct effects of focus on the Triple Aim outcomes and the low level of effects

[9] Note: SRMR could not be reported due to the usage of the full information maximum likelihood (FIML) estimator.



Note: *ns* = not significant; * p < .05; ** p < .01
X^2 = 129.97, df = 73; p-value = .00; RMSEA = .058 [90% CI: .042, .074]; CFI = .98; n = 230

Figure 7: Structural equation modeling results

seen by external horizontal integration, the model was re-ran to examine only the direct effects of hospital focus upon the Triple Aim measures selected for this study. Still controlling for average patient complexity via CMI and hospital size via number of nurses, focus showed a marginally significant effect on experience of care (.15, $p < .10$). This mimics the indirect effect calculated through the Sobel test. The model was also ran with robust standard errors to account for potential heteroscedasticity, this resulted in similar results as the structural model executed for the study; with the path from hospital focus to internal integration (.21, $p < .05$); the path from external horizontal integration to population health (.13, $p < .05$); and the paths from internal horizontal integration to experience of care (.44, $p < .01$), population health (.22, $p < .01$), and cost of care (.12, $p < .05$) all remaining significant.

4.5 Discussion

The research model attempted to gain an understanding of the relationship between focus and the Triple Aim, and then extend that understanding by looking at how expansion of services influenced the outcomes. By looking internally, there is the ability to understand how a focal area in conjunction of the other departments of the hospital impact performance. To that end, while no direct effects were seen. This echoes the results of the KC and Terwiesch (2011), and shows that perceptual measures of focus tend to have a limited impact on firm level outcomes, as well. While focus did not have any direct effects, there were significant indirect effects on experience of care through internal integration. This supports the idea that there is a certain degree of alignment occurs within the hospital in the presence of a focus strategy.

Outside of the effects of the focus construct, interesting results were identified on both the internal and external horizontal integration measures. Externally, integration with partner/alliance

hospitals has the ability to improve the hospital's reach within the regional population. While collaboration and coordination between two hospitals could be viewed as collusion if done improperly (Mobley, 1996), this finding demonstrates that there is potential value to the health of patient populations when hospitals work together. This further supports the idea that integration between care providers is critical to improving population health as predicted in the Triple Aim framework presented by Berwick et al. (2008) Notably, this study also shows very valuable insights into the role of internal integration. Internal integration has a large potential to improve the experience of care. This finding provides encouragement for operations management research to look within the hospital for opportunities for improvement. In addition to the experience of care, both cost of care and population health improved as well.

While focus did not directly impact triple aim outcomes, there is an effect of focus on the hospital's degree of internal integration and an indirect effect upon the quality of care. This would presents an opportunity to determine what else enables internal integration within a hospital.

4.6 Limitations

The main limitation of this study is the cross-sectional, survey research. While no direct causal inference can directly be made, the strength of the theoretical effects can be evaluated, even if limitedly. Given that this primary dataset leads the release schedule for potential secondary performance measures, this limitation can be resolved in the future through pairing of the responses with the corresponding secondary measures of the Triple Aim. Additionally, the survey displayed a limited number of hospitals that actually had partnerships or alliances outside of their respective hospital networks. Inclusion of hospital network effects could better round out the results.

Furthermore, there is the potential to include other forms of integration. While this research looked at horizontal integration as a means of improving service offerings, there are also innate benefits that could be seen from the perspective of the value chain. It would be recommended that vertical directions (i.e. supplier integration and customer integration) be studied in tandem with the horizontal to see if additional benefits could attained from hospitals.

CHAPTER 5 – Conclusion & Contributions

With the passage of the Affordable Care and Patient Protections Acts ("Patient protection and affordable care act," 2010), concepts associated with the Triple Aim became law through the concept of the Value Based Purchasing (Raso, 2015). This leaves the need to better understand how hospitals can take the lead to surpass the performance measures of the Triple Aim.

With the Triple Aim looking to improve the experience of care, improve population health, and reduce the per capita cost of health care, the measures naturally creates a predicament in the ability of a firm to meet all three (Berwick et al., 2008). With a breadth of literature suggesting the benefits of a focused firm, this dissertation attempted to take a deep dive into the concept of focus within the hospital domain. To that end, at its most fundamental level this dissertation provided multiple measures of focus, both secondary and primary. Through studies utilizing the secondary data, it was shown that many of the measures at the MDC and DRG levels yielding similar results. However, it was also shown that the binary representation of focus may be limited in its understanding; many times differing from the rest of the ecological measures.

With focus potentially providing the ability of the hospital to see benefits at the firm level, this dissertation with the last two studies showed that focus benefits do not necessarily transfer into measureable firm benefits, similar to what was seen by KC and Terwiesch (2011); at least not directly. By expanding the work of Clark and Huckman (2012) to look outside of just spillovers and close complementarities of a focal procedure, this research has shown that firm level focus in conjunction with breadth (i.e. average breadth per MDC) has the ability to see greater levels of patient experience while seeing a diminishing cost per additional unit of average breadth.

Furthermore, while focus has a limited effect on the triple aim outcomes, at least directly, there are opportunities for hospitals to leverage the horizontal network – both internal and externally – to see additional benefits. Across the board, internal integration supported the desired outcomes of the Triple Aim. This indicates that there may be strong benefits for hospitals to look within to improve the experience of care, population health, and cost of care. It further shows that externally, there is the potential for hospitals to leverage other hospitals in the coordination of providing care to patient populations. While in many industries this would be called "collusion" if done improperly (i.e not illegally), coordination between hospitals has the ability to improve upon the outcomes of their overarching population.

Lastly, this dissertation explored potential antecedents of hospital focus via environmental influences. Through the first study of this dissertation, it can be seen that the interactions of the environmental variables – munificence, dynamism, and complexity – have significant effects upon the degree of hospital focus. This study showed that some multiplicative effects of dynamism, munificence, and complexity exist. Through this seminal study on the interaction effects of environmental uncertainty, several interesting concepts came to fruition. First, complexity and dynamism lend themselves to be direct influencers to the extent that a firm focuses. This is complicated further, with munificence – which is not directly significant – creating interaction effects with dynamism; as well as three-way interaction with dynamism and complexity.

Holistically, this research provides a closer understanding of why hospitals focus, and what limited effect hospital focus has on the Triple Aim. By testing the effects both with secondary and with survey measures, there is the ability to see that focus alone does not directly influence the outcomes desired by the Triple Aim. This indicates that perhaps further studies of the relationship

between focus, its environment, the breadth of service, and the various forms of integration are needed.

APPENDICES

APPENDIX A: Additional Variable Information

Table 13: Bedsize categories adjusted for location and teaching status[10]

	Hospital Bedsize		
	Small	**Medium**	**Large**
Northeast Region			
Rural	1-49	50-99	100+
Urban, non-teaching	1-124	125-199	200+
Urban, teaching	1-249	250-424	425+
Midwest Region			
Rural	1-29	30-49	50+
Urban, non-teaching	1-74	75-174	175+
Urban, teaching	1-249	250-374	375+
Southern Region			
Rural	1-39	40-74	75+
Urban, non-teaching	1-99	100-199	200+
Urban, teaching	1-249	250-449	450+
Western Region			
Rural	1-24	25-44	45+
Urban, non-teaching	1-99	100-174	175+
Urban, teaching	1-199	200-324	325+

Table 14: Hospital control categories[11]

Variable	Description	Value	Value Description
H_CONTRL	Control/ownership of hospital (definition used prior to 1998)	1	Government, nonfederal
		2	Private, not-profit
		3	Private, invest-own
		.	Missing

[10] "HCUP NIS Description of Data Elements" (2008)
[11] "HCUP NIS Description of Data Elements" (2008)

Table 15: Triple Aim Measurement - Latent Variable Construction

Measure	Scale	Verbiage	Notes
Population Health (α = .83)	1 – 7	Our hospital's regional population has a higher than average life expectancy	
		On average, our hospital's regional population is healthy	
		Our hospital's regional population is characterized by a prevalence of major chronic conditions	
		Our hospital's regional population has a low incidence of physiological factors that negatively influence health (For example: high blood pressure, high BMI, etc.).	
		Our hospital's regional population has a low incidence of behavioral factors that negatively influence health (For example: smoking, drug use, diet, etc.)	
Experience of Care (α = .67)	1 – 7	Our hospital has high patient satisfaction ratings	
		Our hospital has low patient readmission rates	
		Patient care depends on payer status (For example: HMO versus PPO versus Medicaid)	Not Used
		Our hospital is responsive to individual patient preferences and needs.	
		Our hospital's safety record compares favorably with the national average.	
Cost of Patient Care (α = .94)	1 – 7	Our patients and payers pay less for inpatient care than at other hospitals	
		Our patients and payers pay less for outpatient care than at other hospitals	
		On average, our hospital has high levels of hospital utilization	Not Used
		On average, our hospital has high levels of emergency department utilization	Not Used

Note: Some measures were not utilized due to poor factor loading in EFA and CFA

APPENDIX B: Major Diagnostic Categories (MDC)

Table 16: List of Major Diagnostic Categories (MDCs)[12]

MDC	Description
1	Diseases and Disorders of the Nervous System
2	Diseases and Disorders of the Eye
3	Diseases and Disorders of the Ear, Nose, Mouth And Throat
4	Diseases and Disorders of the Respiratory System
5	Diseases and Disorders of the Circulatory System
6	Diseases and Disorders of the Digestive System
7	Diseases and Disorders of the Hepatobiliary System And Pancreas
8	Diseases and Disorders of the Musculoskeletal System And Connective Tissue
9	Diseases and Disorders of the Skin, Subcutaneous Tissue And Breast
10	Diseases and Disorders of the Endocrine, Nutritional And Metabolic System
11	Diseases and Disorders of the Kidney And Urinary Tract
12	Diseases and Disorders of the Male Reproductive System
13	Diseases and Disorders of the Female Reproductive System
14	Pregnancy, Childbirth And Puerperium
15	Newborn And Other Neonates (Perinatal Period)
16	Diseases and Disorders of the Blood and Blood Forming Organs and Immunological Disorders
17	Myeloproliferative DDs (Poorly Differentiated Neoplasms)
18	Infectious and Parasitic DDs (Systemic or unspecified sites)
19	Mental Diseases and Disorders
20	Alcohol/Drug Use or Induced Mental Disorders
21	Injuries, Poison And Toxic Effect of Drugs
22	Burns
23	Factors Influencing Health Status and Other Contacts with Health Services
24	Multiple Significant Trauma
25	Human Immunodeficiency Virus Infection

[12] Adopted from the CMS FY 2008 MDC File from https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Acute-Inpatient-Files-for-Download-Items/CMS1247844.html

BIBLIOGRAPHY

BIBLIOGRAPHY

Aaker, D. A. (1989). *Managing assets and skills: The key to a sustainable competitive advantage*: University of California, Haas School of Business.

Acock, A. C. (2013). *Discovering structural equation modeling using Stata* (1st ed.). College Station, Tex.: Stata Press.

Aldrich, H. (1979). *Organizations and environments*. Englewood Cliffs, N.J.: Prentice-Hall.

Aldrich, H. (2008). *Organizations and environments*. Stanford, Calif.: Stanford Business Books.

Amit, R., & Schoemaker, P. J. (1993). Strategic assets and organizational rent. *Strategic Management Journal, 14*(1), 33-46.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411-423. doi: http://dx.doi.org/10.1037/0033-2909.103.3.411

Andritsos, D. A., & Tang, C. S. (2014). Linking Process Quality and Resource Usage: An Empirical Analysis. *Production and Operations Management, 23*(12), 2163-2177.

Angst, C. M., Devaraj, S., Queenan, C. C., & Greenwood, B. (2011). Performance effects related to the sequence of integration of healthcare technologies. *Production and Operations Management, 20*(3), 319-333.

Averill, R. F., Goldfield, N., Steinbeck, B., Grant, T., Muldoon, J., & Brough, A. (2003). All patient refined diagnosis related groups (APR-DRGs). *Version, 15*, 98-054.

Azadegan, A., Patel, P. C., Zangoueinezhad, A., & Linderman, K. (2013). The effect of environmental complexity and environmental dynamism on lean practices. *Journal of Operations Management, 31*(4), 193-212.

Bagozzi, R. P., & Yi, Y. (1988). On the Evaluation of Structural Equation Models. *Academy of Marketing Science. Journal, 16*(1), 74.

Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of the Academy of Marketing Science, 40*(1), 8-34.

Barney, J. B. (1986). Types of Competition and the Theory of Strategy: Toward an Integrative Framework. *Academy of Management Review, 11*(4), 791-800. doi: 10.5465/AMR.1986.4283938

Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management, 17*(1), 99-99.

Barney, J. B. (2001). Is the resource-based "view" a useful perspective for strategic management research? Yes. *The Academy of Management Review, 26*(1), 41-56.

Begun, J. W., & Kaissi, A. A. (2004). Uncertainty in health care environments: myth or reality? *Health care management review, 29*(1), 31-39.

Benton, W. (2013). A Profitability Evaluation of America's Best Hospitals, 2000–2008. *Decision Sciences, 44*(6), 1139-1153.

Berwick, D. M. (2003). Disseminating innovations in health care. *JAMA, 289*(15), 1969-1975. doi: 10.1001/jama.289.15.1969

Berwick, D. M., & Hackbarth, A. D. (2012). Eliminating waste in us health care. *JAMA, 307*(14), 1513-1516. doi: 10.1001/jama.2012.362

Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: care, health, and cost. *Health Affairs, 27*(3), 759-769.

Bhargava, H. K., & Mishra, A. N. (2014). Electronic Medical Records and Physician Productivity: Evidence from Panel Data Analysis. *Management Science, 60*(10), 2543-2562.

Bisognano, M., & Kenney, C. (2012). *Pursuing the triple aim: seven innovators show the way to better care, better health, and lower costs*: John Wiley & Sons.

Boyd, B. K. (1995). CEO duality and firm performance: A contingency model. *Strategic Management Journal, 16*(4), 301-312.

Boyer, K. K., Gardner, J. W., & Schweikhart, S. (2012). Process quality improvement: An examination of general vs. outcome-specific climate and practices in hospitals. *Journal of Operations Management, 30*(4), 325-339. doi: http://dx.doi.org/10.1016/j.jom.2011.12.001

Boyer, K. K., & Pronovost, P. (2010). What medicine can teach operations: What operations can teach medicine. *Journal of Operations Management, 28*(5), 367-371. doi: 10.1016/j.jom.2010.08.002

Bradley, S. W., Shepherd, D. A., & Wiklund, J. (2011). The importance of slack for new organizations facing 'tough'environments. *Journal of management studies, 48*(5), 1071-1097.

Butler, T. W., Leong, G. K., & Everett, L. N. (1996). The operations management role in hospital strategic planning. *Journal of Operations Management, 14*(2), 137-156. doi: http://dx.doi.org/10.1016/0272-6963(95)00041-0

Caputo, M., & Mininno, V. (1996). Internal, vertical and horizontal logistics integration in Italian grocery distribution. *International Journal of Physical Distribution & Logistics Management, 26*(9), 64-90.

Chandler, A. D. (1990). Scale and scope: The dynamics of industrial competition. *Cambridge, MA, Harvard Business School*.

Chatterjee, S., & Blocher, J. D. (1992). Measurement of Firm Diversification: Is It Robust? *The Academy of Management Journal, 35*(4), 874-888.

Chen, D. Q., Preston, D. S., & Xia, W. (2013). Enhancing hospital supply chain performance: A relational view and empirical test. *Journal of Operations Management, 31*(6), 391-408.

Chesteen, S., Helgheim, B., Randall, T., & Wardell, D. (2005). Comparing quality of care in non-profit and for-profit nursing homes: a process perspective. *Journal of Operations Management, 23*(2), 229-242. doi: http://dx.doi.org/10.1016/j.jom.2004.08.004

Clark, J. R., & Huckman, R. S. (2012). Broadening focus: Spillovers, complementarities, and specialization in the hospital industry. *Management Science, 58*(4), 708-722.

Coyne, J. S., Hilsenrath, P. E., Arbuckle, B. S., Kureshy, F., Vaughan, D., Grayson, D., & Saygin, T. (2014). Triple Aim Program: Assessing Its Effectiveness as a Hospital Management Tool. *Hospital Topics, 92*(4), 88-95. doi: 10.1080/00185868.2014.968488

Cuellar, A. E., & Gertler, P. J. (2003). Trends in hospital consolidation: the formation of local systems. *Health Affairs, 22*(6), 77-87.

Cutler, D. M., & Scott Morton, F. (2013). Hospitals, market share, and consolidation. *JAMA, 310*(18), 1964-1970. doi: 10.1001/jama.2013.281675

Das, A., Narasimhan, R., & Talluri, S. (2006). Supplier integration—Finding an optimal configuration. *Journal of Operations Management, 24*(5), 563-582. doi: http://dx.doi.org/10.1016/j.jom.2005.09.003

de Blok, C., Meijboom, B., Luijkx, K., & Schols, J. (2013). The human dimension of modular care provision: opportunities for personalization and customization. *International Journal of Production Economics, 142*(1), 16-26.

Dess, G. G., & Beard, D. W. (1984). Dimensions of Organizational Task Environments. *Administrative Science Quarterly, 29*(1), 52-73. doi: 10.2307/2393080

Ding, D. X. (2014). The effect of experience, ownership and focus on productive efficiency: A longitudinal study of US hospitals. *Journal of Operations Management, 32*(1), 1-14.

Ding, D. X. (2015). The impact of service design and process management on clinical quality: An exploration of synergetic effects. *Journal of Operations Management, 36*(0), 103-114. doi: http://dx.doi.org/10.1016/j.jom.2015.03.006

Dobrzykowski, D. D., Deilami, V. S., Hong, P., & Kim, S.-C. (2014). A structured analysis of operations and supply chain management research in healthcare (1982–2011). *International Journal of Production Economics, 147*, 514-530.

Dobrzykowski, D. D., McFadden, K. L., & Vonderembse, M. A. (2016). Examining pathways to safety and financial performance in hospitals: A study of lean in professional service operations. *Journal of Operations Management, 42–43*, 39-51. doi: http://dx.doi.org/10.1016/j.jom.2016.03.001

Donaldson, L. (1999). The normal science of structural contingency theory. *Studying Organizations: Theory and Method. Thousand Oaks, Calif: Sage*, 51-70.

Douglas, T. J., & Ryman, J. A. (2003). Understanding Competitive Advantage in the General Hospital Industry: Evaluating Strategic Competencies. *Strategic Management Journal, 24*(4), 333-347. doi: 10.2307/20060536

Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. *Administrative Science Quarterly*, 313-327.

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review, 23*(4), 660-679.

Elkington, J. (1997). Cannibals with Forks: the triple bottom line of 21st century business. Capstone Publ: Oxford.

Elkington, J. (1999). Triple bottom-line reporting: Looking for balance. *AUSTRALIAN CPA, 69*, 18-21.

Ferrand, Y. B., Magazine, M. J., & Rao, U. S. (2014). Partially Flexible Operating Rooms for Elective and Emergency Surgeries. *Decision Sciences, 45*(5), 819-847. doi: 10.1111/deci.12096

Fetter, R. B. (1991). Diagnosis related groups: understanding hospital performance. *Interfaces, 21*(1), 6-26.

Fetter, R. B., & Freeman, J. L. (1986). Diagnosis Related Groups: Product Line Management within Hospitals. *The Academy of Management Review, 11*(1), 41-54. doi: 10.2307/258330

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of Operations Management, 28*(1), 58-71.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Fottler, M. D., Schermerhorn, J. R., Wong, J., & Money, W. H. (1982). Multi-Institutional Arrangements in Health Care: Review, Analysis, and a Proposal for Future Research. *The Academy of Management Review, 7*(1), 67-79. doi: 10.2307/257250

Frohlich, M. T., & Westbrook, R. (2001). Arcs of integration: An international study of supply chain strategies. *Journal of Operations Management, 19*(2), 185-200.

Garg, V. K., Walters, B. A., & Priem, R. L. (2003). Chief Executive Scanning Emphases, Environmental Dynamism, and Manufacturing Firm Performance. *Strategic Management Journal, 24*(8), 725-744. doi: 10.1002/smj.335

General Accounting Office (GAO), U. S. (2003). Specialty hospitals: geographic location, services provided, and financial performance. *General Accounting Office, Washington, DC*, 1-41.

Goldstein, S. M., & Iossifova, A. R. (2012). Ten years after: Interference of hospital slack in process performance benefits of quality practices. *Journal of Operations Management, 30*(1), 44-54.

Goldstein, S. M., & Naor, M. (2005). Linking publicness to operations management practices: a study of quality management practices in hospitals. *Journal of Operations Management, 23*(2), 209-228. doi: http://dx.doi.org/10.1016/j.jom.2004.07.007

Grant, R. M. (1996). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organization Science, 7*(4), 375-387.

Harrison, J. S., Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. (2001). Resource complementarity in business combinations: Extending the logic to organizational alliances. *Journal of Management, 27*(6), 679-690. doi: http://dx.doi.org/10.1016/S0149-2063(01)00118-0

Hayes, R. H., Pisano, G., Upton, D., & Wheelwright, S. (2005). *Operations, strategy, and technology : pursuing the competitive edge*. Hoboken, NJ: Wiley.

Hayes, R. H., & Wheelwright, S. C. (1984). *Restoring our competitive edge : competing through manufacturing*. New York: Wiley.

HCUP Nationwide Inpatient Sample (NIS). (2011). from Agency for Healthcare Research and Quality, Rockville, MD www.hcup-us.ahrq.gov/nisoverview.jsp

HCUP NIS Description of Data Elements. ((2008). from Agency for Healthcare Research and Quality, Rockville, MD www.hcup-us.ahrq.gov/db/vars/hosp_location/nisnote.jsp

Hendricks, K. B., & Singhal, V. R. (2003). The effect of supply chain glitches on shareholder wealth. *Journal of Operations Management, 21*(5), 501-522. doi: 10.1016/j.jom.2003.02.003

Heskett, J. L. (1983). Shouldice Hospital Limited. *Harvard Business School Case No. 9-683-068*.

Heskett, J. L. (1986). *Managing in the service economy*. Boston, Mass.: Harvard Business School Press.

Hindle, T. (2008). *Guide to management ideas and gurus* (Vol. 42): John Wiley & Sons.

Hitt, M. A., Hoskisson, R. E., & Kim, H. (1997). International diversification: Effects on innovation and firm performance in product-diversified firms. *Academy of Management Journal, 40*(4), 767-798.

Hoskisson, R. E., & Busenitz, L. W. (2002). Market uncertainty and learning distance in corporate entrepreneurship entry mode choice. *Strategic entrepreneurship: Creating a new mindset, 151172*.

Hu, L.-t., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Structural Equation Modeling, 6*(1), 1-55.

Hyer, N. L., Wemmerlöv, U., & Morris, J. A. (2009). Performance analysis of a focused hospital unit: The case of an integrated trauma center. *Journal of Operations Management, 27*(3), 203-219.

Jayaram, J., Droge, C., & Vickery, S. K. (1999). The impact of human resource management practices on manufacturing performance. *Journal of Operations Management, 18*(1), 1-20. doi: http://dx.doi.org/10.1016/S0272-6963(99)00013-3

Jayaram, J., Tan, K.-C., & Nachiappan, S. (2010). Examining the interrelationships between supply chain integration scope and supply chain management efforts. *International Journal of Production Research, 48*(22), 6837-6857.

Kaplan, D. (2009). *Structural equation modeling : foundations and extensions* (2nd ed.). Los Angeles: SAGE.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard--measures that drive performance (Vol. 70, pp. 71). UNITED STATES: Harvard Business Review.

Kaplan, R. S., & Norton, D. P. (1996). Using the balanced scorecard as a strategic management system. *Harvard Business Review, 74*(1), 75-85.

Kaplan, R. S., & Norton, D. P. (2007). Using the balanced scorecard as a strategic management system (Vol. 85, pp. 150-161). Boston: Harvard Business School Publ. Corp.

KC, D. S., & Terwiesch, C. (2011). The effects of focus on performance: Evidence from California hospitals. *Management Science, 57*(11), 1897-1912.

Keats, B. W., & Hitt, M. A. (1988). A Causal Model of Linkages among Environmental Dimensions, Macro Organizational Characteristics, and Performance. *The Academy of Management Journal, 31*(3), 570-598. doi: 10.2307/256460

Kekre, S., & Srinivasan, K. (1990). Broader Product Line: A Necessity to Achieve Success? *Management Science, 36*(10), 1216-1231.

Ketokivi, M., & Jokinen, M. (2006). Strategy, uncertainty and the focused factory in international process manufacturing. *Journal of Operations Management, 24*(3), 250-270.

Kutscher, B. (2014). Hospitals, systems see operating margins shrink as expenses climb. *Modern Healthcare.* Retrieved 04/19/2016, 2014

Leuschner, R., Rogers, D. S., & Charvet, F. F. (2013). A Meta-Analysis of Supply Chain Integration and Firm Performance. *Journal of Supply Chain Management, 49*(2), 34-57. doi: 10.1111/jscm.12013

Li, L. X., & Benton, W. (2006). Hospital technology and nurse staffing management decisions. *Journal of Operations Management, 24*(5), 676-691.

Li, L. X., Benton, W., & Leong, G. K. (2002). The impact of strategic operations management decisions on community hospital performance. *Journal of Operations Management, 20*(4), 389-408.

Lockett, A., & Thompson, S. (2001). The resource-based view and economics. *Journal of Management, 27*(6), 723-754.

McDermott, C. M., & Stock, G. N. (2011). Focus as emphasis: conceptual and performance implications for hospitals. *Journal of Operations Management, 29*(6), 616-626.

McLaughlin, C. P., Yang, S., & van Dierdonck, R. (1995). Professional Service Organizations and Focus. *Management Science, 41*(7), 1185-1193. doi: 10.2307/2632775

Menachemi, N., Shin, D. Y., Ford, E. W., & Yu, F. (2011). Environmental factors and health information technology management strategy. *Health care management review, 36*(3), 275-285.

Miller, D. (1986). Configurations of Strategy and Structure: Towards a Synthesis. *Strategic Management Journal, 7*(3), 233-233.

Mobley, L. R. (1996). Tacit collusion among hospitals in price competitive markets. *Health economics, 5*(3), 183-193.

Morris, E. K., Caruso, T., Buscot, F., Fischer, M., Hancock, C., Maier, T. S., . . . Rillig, M. C. (2014). Choosing and using diversity indices: insights for ecological applications from the German Biodiversity Exploratories. *Ecology and Evolution, 4*(18), 3514-3524. doi: 10.1002/ece3.1155

Nair, A., Nicolae, M., & Narasimhan, R. (2013). Examining the impact of clinical quality and clinical flexibility on cardiology unit performance—Does experiential quality act as a specialized complementary asset? *Journal of Operations Management, 31*(7), 505-522.

Narasimhan, R., & Kim, S. W. (2002). Effect of supply chain integration on the relationship between diversification and performance: evidence from Japanese and Korean firms. *Journal of Operations Management, 20*(3), 303-323.

Noseworthy, J. H. (2014). *What is ahead for Mayo Clinic?* Paper presented at the Mayo Clinic Proceedings.

Patel, P. C., Azadegan, A., & Ellram, L. M. (2013). The Effects of Strategic and Structural Supply Chain Orientation on Operational and Customer-Focused Performance. *Decision Sciences, 44*(4), 713-753.

Patient protection and affordable care act. (2010). *Public Law*, 111-148.

Penrose, E. T. (1959). *The theory of the growth of the firm*: Wiley.

Pesch, M. J., Pesch, M. J., & Schroeder, R. G. MEASURING FACTORY FOCUS: AN EMPIRICAL STUDY. *Production and Operations Management, 5*(3), 234-254. doi: 10.1111/j.1937-5956.1996.tb00396.x

Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal, 14*(3), 179-191.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879.

Porter, M. E. (1980). *Competitive strategy : techniques for analyzing industries and competitors*. New York: Free Press.

Porter, M. E. (1985). *Competitive advantage : creating and sustaining superior performance*. New York London: Free Press; Collier Macmillan.

Ragatz, G. L., Handfield, R. B., & Petersen, K. J. (2002). Benefits associated with supplier integration into new product development under conditions of technology uncertainty. *Journal of Business Research, 55*(5), 389-400. doi: http://dx.doi.org/10.1016/S0148-2963(00)00158-2

Rajagopalan, N., Rasheed, A. M., & Datta, D. K. (1993). Strategic decision processes: Critical review and future directions. *Journal of Management, 19*(2), 349-384.

Raso, R. (2015). Value-Based Purchasing: Are you part of the shift? *Nursing management, 46*(5), 24-31.

Raue, J. S., & Wieland, A. (2015). The interplay of different types of governance in horizontal cooperations: A view on logistics service providers. *The International Journal of Logistics Management, 26*(2), 401-423.

Riccobono, F., Bruccoleri, M., Harrigan, K. R., & Perrone, G. (2014). Do horizontal relationships matter to production and operations managers? *International Journal of Production Research, 52*(16), 4731-4746.

Robusto, C. (1957). The cosine-haversine formula. *The American Mathematical Monthly, 64*(1), 38-40.

Rosenbusch, N., Rauch, A., & Bausch, A. (2013). The Mediating Role of Entrepreneurial Orientation in the Task Environment–Performance Relationship: A Meta-Analysis. *Journal of Management, 39*(3), 633-659. doi: 10.1177/0149206311425612

Routledge, R. D. (1980). Bias in Estimating the Diversity of Large, Uncensused Communities. *Ecology, 61*(2), 276-281. doi: 10.2307/1935186

Scherer, F. M. (1980). *Industrial market structure and economic performance*. Boston: Houghton Mifflin.

Schoenherr, T., Ellram, L. M., & Tate, W. L. (2015). A Note on the Use of Survey Research Firms to Enable Empirical Data Collection. *Journal of Business Logistics, 36*(3), 288-300. doi: 10.1111/jbl.12092

Schoenherr, T., & Swink, M. (2012). Revisiting the arcs of integration: Cross-validations and extensions. *Journal of Operations Management, 30*(1), 99-115.

Sharma, L., Chandrasekaran, A., Boyer, K. K., & McDermott, C. M. (2016). The impact of Health Information Technology bundles on Hospital performance: An econometric study. *Journal of Operations Management, 41*, 25-41. doi: http://dx.doi.org/10.1016/j.jom.2015.10.001

Skaggs, B. C., & Huffman, T. R. (2003). A customer interaction approach to strategy and production complexity alignment in service firms. *Academy of Management Journal, 46*(6), 775-786.

Skinner, W. (1974). The focused factory. *Harvard Business Review, 52*(3), 113-121.

Smith, A. L., Bradley, R. V., Bichescu, B. C., & Tremblay, M. C. (2013). IT Governance Characteristics, Electronic Medical Records Sophistication, and Financial Performance in US Hospitals: An Empirical Investigation. *Decision Sciences, 44*(3), 483-516.

Sobel, M. E. (1982). Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models. *Sociological Methodology, 13*, 290-312.

Soosay, C. A., Hyland, P. W., & Ferrer, M. (2008). Supply chain collaboration: capabilities for continuous innovation. *Supply Chain Management: An International Journal, 13*(2), 160-169.

Starbuck, W. H., & Mezias, J. M. (1996). Opening Pandora's box: studying the accuracy of managers' perceptions. *Journal of Organizational Behavior, 17*(2), 99-117. doi: 10.1002/(SICI)1099-1379(199603)17:2<99::AID-JOB743>3.0.CO;2-2

StataCorp. (2011). *Stata 12 Base Reference Manual*. College Station, TX: Stata Press.

Stiefel, M., & Nolan, K. (2012). A guide to measuring the triple aim: population health, experience of care, and per capita cost. *IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement*.

Stirling, G., Wilsey, B., & Associate Editor: Daniel, S. (2001). Empirical Relationships between Species Richness, Evenness, and Proportional Diversity. *The American Naturalist, 158*(3), 286-299. doi: 10.1086/321317

Stock, G. N., McFadden, K. L., & Gowen, C. R. (2007). Organizational culture, critical success factors, and the reduction of hospital errors. *International Journal of Production Economics, 106*(2), 368-392.

Swink, M., Narasimhan, R., & Wang, C. (2007). Managing beyond the factory walls: Effects of four types of strategic integration on manufacturing plant performance. *Journal of Operations Management, 25*(1), 148-164. doi: http://dx.doi.org/10.1016/j.jom.2006.02.006

Teece, D. J. (1982). Towards an economic theory of the multiproduct firm. *Journal of Economic Behavior & Organization, 3*(1), 39-63.

Teixeira, R., Koufteros, X., & Peng, X. D. (2012). Organizational structure, integration, and manufacturing performance: A conceptual model and propositions. *Journal of Operations and Supply Chain Management, 5*(1), 70-81.

Thaldorf, C., & Liberman, A. (2007). Integration of Health Care Organizations: Using the Power Strategies of Horizontal and Vertical Integration in Public and Privatre Health Systems. *The health care manager, 26*(2), 116.

Vickery, S. K., Droge, C., & Markland, R. E. (1997). Dimensions of manufacturing strength in the furniture industry. *Journal of Operations Management, 15*(4), 317-330.

Vickery, S. K., Jayaram, J., Droge, C., & Calantone, R. (2003). The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. *Journal of Operations Management, 21*(5), 523-539. doi: http://dx.doi.org/10.1016/j.jom.2003.02.002

Voss, C. A., & Hsuan, J. (2009). Service Architecture and Modularity. *Decision Sciences, 40*(3), 541-569. doi: 10.1111/j.1540-5915.2009.00241.x

Ward, P. T., & Duray, R. (2000). Manufacturing strategy in context: environment, competitive strategy and manufacturing strategy. *Journal of Operations Management, 18*(2), 123-138.

Ward, P. T., Duray, R., Keong Leong, G., & Sum, C.-C. (1995). Business environment, operations strategy, and performance: An empirical study of Singapore manufacturers. *Journal of Operations Management, 13*(2), 99-115. doi: http://dx.doi.org/10.1016/0272-6963(95)00021-J

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171-180. doi: 10.1002/smj.4250050207

White, D. L., Froehle, C. M., & Klassen, K. J. (2011). The effect of integrated scheduling and capacity policies on clinical efficiency. *Production and Operations Management, 20*(3), 442-455.

Wong, C. Y., Boon-itt, S., & Wong, C. W. Y. (2011). The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance. *Journal of Operations Management, 29*(6), 604-615. doi: http://dx.doi.org/10.1016/j.jom.2011.01.003

Xue, L., Ray, G., & Gu, B. (2011). Environmental uncertainty and IT infrastructure governance: A curvilinear relationship. *Information Systems Research, 22*(2), 389-399.

Zajac, E. J., & Olsen, C. P. (1993). From transaction cost to transactional value analysis: Implications for the study of interorganizational strategies*. *Journal of management studies, 30*(1), 131-145.