A Franchise Education:
The Impact of High School Quality on the Operations of Quick Service Restaurant Franchises in Texas

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Abstract

While the franchise business model provides customers with a certain level of consistency, there is still considerable variation in service quality across locations. Among other factors, a franchise's quality of human capital (i.e., its workers) contributes to the quality of its operations, one of the strongest determinants of its revenue. Assuming that low wage workers have minimal geographical mobility, this paper studies how worker education impacts operation scores at the Texas locations of a quick service restaurant franchise brand by studying local school quality. This analysis controls for internal and external operations influences, such as the franchisee, designated market area, retail location type, the location's proximity to a highway, and per capita income of the area to isolate the effect of school quality on operations. Ultimately, this study finds that higher school quality ratings have a significant and positive impact on the operations of franchises, and that operations have a significant and positive impact on sales revenue. Decomposing operations scores, this study finds that school quality ratings primarily impact operations by reducing customer complaints.

Introduction

Customers expect a lot from the franchise brands they know. When they go to the local Starbucks, McDonalds, or Taco Bell, they want a well-known chain with quality service and a reliable taste. Nevertheless, not all quick service restaurant franchises are created equal; at some the service is rude, the order takes longer than anticipated, and they get it wrong. These sub-par franchises are often in the poorer parts of town or areas with poorer quality schools. It raises the question of whether the employees of these franchises are less skilled because they receive a lackluster education from local high schools.

Today, franchising is one of the most visible and reliable business formats. Yet not all franchise locations are the same: some are cleaner, some are newer, and some have better operations. The quality of operations at each franchise is one of the strongest determinants of revenue, a franchise's ultimate goal. Among other factors, a franchise's quality of human capital (i.e., its workers) contributes to the quality of its operations. This paper attempts to analyze how worker education affects operation scores at the Texas locations of a national quick service restaurant (QSR) franchise by studying local school quality.

According to the *American Heritage Dictionary*, the word *franchise* comes from the French word *franche*, which means free or exempt (Blair and Lafontaine, 2005). In medieval times, a franchise was a right or a privilege granted by a sovereign. Sovereigns granted franchised activities like building roads, holding fairs, and organizing markets. The sovereign had a monopoly over the activity, but gave it away in exchange for a portion of the profit–a royalty (*Ibid.)*. The modern franchise business model appeared in the 19th century, but it was not until the 1950's economic boom (post-WWII) that franchising fully established itself as we see it today (Dicke, 1992).

Currently, it is difficult to characterize the typical franchise agreement because there are many forms. Some franchise agreements allow for the use of a product, trademark, or business format, while others allow for complete ownership of a given geographical market. According to the Federal Trade Commission, three elements constitute a franchise: the franchisor has a licensed trade name or trademark, the franchisor exerts significant control over the operations of the business, and the franchisee pays a minimum of $500 lump sum to the franchisor upon opening. In the standard financial format of an agreement, the franchisees pay a lump-sum fee when they sign the contract and running royalties that are calculated as a fixed percentage of the franchisee's sales revenues (FTC, 1979).

There are many draws to the franchise business model. For the franchisor, it provides the ability to expand quickly without a large investment cost and logistical coordination. For franchisees, opening a franchise allows them to own and operate a secure business, using a recognized brand, that has a low probability of failing. Nevertheless, one of the biggest draws of the franchise business model is that separately owned locations can provide consistent products and experiences for their customers.

While a significant portion of a franchise business is standardized, there has been considerable research on what factors determine the success (i.e., the sales revenue) of a QSR franchise. Among these factors, operational caliber plays a key role in determining revenue. In this study, operational success of a franchise is measured through customer experience ratings, corporate inspector ratings, customer complaints, and speed of service. This analysis explores the relevant factors that influence the operations of a franchise, principally, its employees. Worker quality (education) can make—or break—a business. Independent studies have linked

worker education to increased productivity in various businesses.[1] Therefore, better educated employees would likely have a positive influence on a franchise's performance.

This study attempts to capture employee education through local school quality, and determine its impact on operations. In order to fully capture the quality of a school, it is necessary to consider other inputs of operations. Specifically, internal operations drivers such as the building and franchisee, as well as external operations drivers such as per capita income of the area and local markets, are important variables to consider. With these influences properly controlled for, education quality will be measured through school accountability ratings, an index of student outcome measures (by demographic), including improvements in standardized test scores, completion rates, and dropout rates. This study will build upon previous research through its deeper exploration of QSR franchise locations' performance scores and their connection to local education/socioeconomic factors.

Ultimately, this paper hypothesizes that, holding constant internal and external operations influences, the quality of local schools will have a positive and significant effect on the operation scores of franchises. This analysis controls for factors such as the franchisee, designated market area, location type, location's proximity to a highway, and per capita income of the area. These results could demonstrate that marginal increases in school quality signify better educated employees and positive increases in operational quality, which would translate in higher sales revenue.

[1] See Moretti (2004) and Fleisher, Hu and Li (2005).

Literature Review

There is a wide range of research topics regarding the franchising business model, as well as the impact of employee education on work outcomes. This paper outlines relevant topics on franchising, employee productivity, worker mobility, and education quality.

To start, the U.S. Department of Commerce notes two distinct forms of franchise agreements. First, the traditional franchise agreement sells the right to use or sell a product with a trade name, for example, car dealerships that sell a brand of car, but have no required or set operations. Conversely, business-format franchise agreements sell the right to a way of doing business; fast food restaurants, which run a set operation, are an example of this. Although, the majority of franchises (72.7%) use traditional agreements (i.e., grant the right to sell a product), most franchise agreements have some aspects of both types (USDOC, 1998; Blair and Lafontaine 2005). Furthermore, a wide array of industries use the franchising business model, ranging from gas stations to soft-drink bottlers.

Nevertheless, retailing businesses dominate franchising: 87% of the franchised businesses in this country are retail businesses, which constitute 35% of all U.S. retail sales (USDOC, 1998). See Table 1a and Table 1b for this breakdown. This paper will analyze the Texas locations of a national business-format franchised retail chain, that is, a QSR franchise.

Table 1a: Breakdown of Franchises by Agreement Type

	Traditional (product) FZ agreement	Business-format FZ agreement
Percentage of Total Franchised Companies	72.7%	27.3%

Table 1b: Breakdown of Franchise Businesses by Retail and Non-Retail Business Type

	Among All Franchised Companies	Among All Retail Companies
Percentage of Total Retail Franchise Sales	87%	35%

The franchising business model serves to benefit both growing companies and risk averse entrepreneurs. For a company, this model allows them to expand quickly without having to micro-manage each location and incur the risks for additional locations. Conversely, for entrepreneurs, starting an independent business can be risky and often results in wasted time, money, and energy. Opening a franchise provides the opportunity to own a business with a lower risk of failure. Blair and Lafontaine (2005) cite many studies to demonstrate that being a franchisor is risky, while being a franchisee is relatively safer. That is to say, it is more likely for a young company to go out of business if and as it attempts to open franchises, rather than regular company-owned chain locations, because of logistical issues. It is relatively safer, however, for entrepreneurs to open franchise locations than independent businesses; fewer franchised locations fail than independent businesses in the same industry (Bates, 1998). In the 1970's, Hunt and Stanworth found that 52% and 33%, respectively, of franchisees surveyed in the U.K. would not have opened an independent business because it is not as safe as a franchise (Hunt, 1972; Stanworth, 1977).

One misconception of franchises that is analyzed by Blair and Lafontaine (2005) is the idea that most franchise units are owned by "mom and pop" franchisees who own only a few

locations each. In reality, some franchisees are massive corporations with corporate managers operating dozens of distant locations each. Indeed, it was found that 84% of new franchised units are opened by exiting multi-unit operators. These units benefit from the owner's prior experience and are more likely to survive than franchises opened by new franchisees (Bates, 1998). In fact, Williams (1999) found that new franchisees tended to have a higher level of education but lower business experience than entrepreneurs who open similar businesses independently. This suggests that there exists a wide range of skill and business savvy between franchisees, which in turn would create differences in the operational quality of their locations.

Nonetheless, the franchise business model creates a certain level of consistency for customers. Even though a large portion of the operations is standardized, there is still large variation across locations. Researchers have tried to understand what factors are critical to the survival of a new franchise unit (Kalnins and Mayer, 2004): street location, brand, and local market are among the significant factors. Operational quality is one of the most important metrics to a franchise business' survival and/or revenue. The International Telecommunication Union, ITU, (1994) defines quality of service (i.e., operations) as largely product error rates and speed of service. Parasuraman, Zeithaml and Berry (1985) note the difficulty of measuring service quality, but suggest that it can be thought of as the space between expectation and performance. For QSR franchises, customer experience ratings, customer complains, speed of service, and corporate inspector ratings capture this gap.

Employees play a fundamental role in developing the perception of service and operations in numerous ways. Chigozirim and Mazarani (2008) found that empowered employees can significantly impact the operations quality. In short, higher quality workers translate into better operations. Moretti (2004) attempts to similarly link worker education and

business productivity. He claims that as human capital increases, as measured by the number of college graduates in an area, so does the output per worker at local production plants. Although the increase in productivity is offset by increased labor costs (i.e., better educated workers demand higher compensation), Moretti shows that an increase in the college educated population had a significant and positive impact on plant productivity. In short, it has been repeatedly demonstrated that better worker education is linked to higher productivity.[2]

Other studies attempt to understand who works at low to minimum wage QSR jobs. One study found that 37.8% of low-wage workers are below the age of 25, and there is a larger portion of minorities working these jobs than there are working higher paying jobs (Acs, 1999). Approximately a third of low-wage workers do not have a high school diploma, a third have only a high school diploma, and a third have some amount of education beyond high school (*Ibid.*). Schmitt (2012) finds that, currently, the average low-wage worker is around 35 years old and that the average age has been increasing since 1979, when it was 32 years old. Additionally, over a third of all low-wage workers are under the age of 25 (*Ibid.*). In other words, a significant portion of the workers at QSR franchises are young and/or minorities.

Nevertheless, Parcel and Sickmeier (1998) explain that among QSR franchises, there are dual labor markets; in other words, companies hire from different labor pools for different levels of their corporate hierarchy. Corporate employees are hired through active recruiting and through the ladder of the company owned locations. Franchise employees, in contrast, are hired from local labor markets, and many of them began as customers. Other studies concur that low wage workers are often selected from local labor markets due to lack of recruiting abilities by

[2] For a theoretical model of this, see Moretti (2004). For an empirical analysis of this, see Fleisher, Hu and Li (2006) and Gintis (1971).

franchises.[3] Moreover, Adams (2006) demonstrates that human capital, life-cycle, household, neighborhood, and city factors restrict geographic (residential) mobility. Adams shows that income has a significant and positive impact on a household's likelihood of moving. Additional studies found that income level had a significant restriction on a family's decision and/or ability to move residences.[4] In interviews with low-income families, Clifton (2004) found that many of these households are restricted by their means of transportation in day to day life. These studies suggest that low-wage workers were raised and educated in the area that they currently work. With these foundational assumptions, this paper attempts to measure employee education and local school quality.

It is not easy to measure the quality of education these workers have received, as there is considerable debate on how to accurately capture school quality. Ladd and Leob (forthcoming) claim that school quality can be approximated through measures of school resources, internal process and practices, and student outcomes. In terms of resources, they note the importance of spending per pupil, which often translates into better textbooks, materials, teacher/pupil ratio, etc. They note, however, that this measure is biased, because of cost differences in each market and income endogeniety (i.e., schools in wealthier areas are rated higher simply because they have more money). Additionally, Ladd and Leob assert that directly measuring student outcomes is the perfect quality measure, but test scores do not always capture learning. Skeptics disagree with standardized testing as an accurate measure of quality[5] and acknowledge the

[3] See the case study from Minerals Council of Australia (2013).
[4] See South and Crowder (1998), who also find that income has a positive and significant impact on mobility. Additionally, South and Deane (1993) further explains the relationship between life-cycle, households, and city features with mobility decisions. Lastly, see Pinto (2002) who ties the low-income residential mobility to housing/moving costs and one's inability to commute to work or receive a loan.
[5] See Popham (199) of the Association for Supervision and Curriculum Development (ASCD).

separate effects of cognitive and non-cognitive skills on performance.[6] Many studies, including Brunello and Schlotter (2011), show that non-cognitive skills have a strong impact on school outcomes, such as test scores, and have positive effects on workers' ability.[7] Specifically they say that non-cognitive skills include determination, perseverance, communication, and intrapersonal skills. Another measurement bias commonly cited is school composition bias; school achievements can be attributed to the quality of the student and his/her peers rather than the quality of the school itself. Rothstein (2003) points out that wealthy parents tend to cluster together and choose schools for their desirable peer groups instead of their instructional superiority. Thrupp, Lauder and Robinson (2002) concur and claim that school composition bias makes school quality difficult to measure.[8]

This study draws from the standard operations metrics and other demographic information to measure education quality while addressing possible human capital biases. It reaches past previous studies through a comprehensive dataset to explain the human capital aspect of operations through local school quality. By examining human capital, as approximated through local school quality, and connecting it with business operations, this analysis will reveal a key driver of operations and revenue that has not yet been thoroughly analyzed.

Empirical Specification

A general presumption underlying this study is that franchise locations with better operations have higher sales. The first regression of this study will show the significance of

[6] For studies about the impact of non-cognitive skills on performance, see Carneiro, Crawford and Goodman (2007).
[7] See Naemi, Burrus, Kyllonen and Roberts (2012), Farrington, Roderick, Allensworth, Nagaoka, Keyes, Johnson, and Beechum (2012), and Heckman, Stixrud, and Urzua (2006) for more studies that explain non-cognitive skills and link them to education and employement outcomes.
[8] See Evans, Oates and Schwab (1992); Lauder, Kounali, Robinson, Goldstein (2010) for more composition bias studies.

operations (an index comprised of customer experience ratings, corporate inspector ratings, customer complaints, and speed of service) on sales. In addition to operations, this study will try to explain the variation in sales as a result of other variables that could explain higher customer purchasing power, for example per capita income and the DMA (Designated Market Area). This study accounts for variables that might cause higher customer frequency, such as a franchise location's proximity to a highway, its type of retail building (e.g., in a mall, airport, freestanding with a drive-thru, etc.), and whether the building itself is remodeled. Thus, based on operations and other franchise location factors, this study will principally focus on operations' relationship with sales.

Specifically, this regression will use the natural log of each continuous variable: sales revenue, operations scores, and per capita income. DMA will be used as a dummy variable. Operations index (*Ops*), the explanatory variable, is an index which indicates better operations through four components: customer experience ratings (*CustmRate*), corporate inspector ratings (*CorpInspRate*), customer complaints (*CustmComplaints*), and speed of service (*SoS*). In addition, this model considers that the franchisee might cause some of the variation in sales. Thus, it uses standard error clustering, which allows for intragroup correlation between franchisees (relaxing the usual requirement that the observations are independent). The OLS regression model, for each franchise unit *i*, is shown bellow (see Table 2 for further explanation of each variable and Tables 9-12 in *Appendix* for summary statistics).

$$Log\_Sales_i = \alpha + \beta_1 Log\_Ops_i + \beta_2 Near\_HW_i + \beta_3 Remodel_i + \beta_4 Free\_Stand_i + \beta_5 Log\_Income_i + \beta_6 DMA\_Dum_i + \varepsilon_i (Franchisee\ Fixed\ Effect)$$

Table 2: Regression Variables for Operations on Sales Model

Log_Sales	Natural log of TTM (Trailing Twelve Months) Sales Revenue (2013)
Log_Ops	Natural log of operations scores comprised of speed of service, customer complains, and corporate inspector ratings
Near_HW	Variable = 1 if franchise location is within 2 miles of a major state or interstate highway
Remodel	Variable = 1 if franchise location has been remodeled recently and is the newest building model
Free_Stand	Variable = 1 if franchise location is a freestanding building (not in a retail strip)
Log_Income	Natural log of per capital income in the census tract of the franchise location
DMA_Dum	Dummy variable for the Designated Market Area of the franchise location

Based on this regression, this study will determine whether operations have a significant impact on sales revenue, as well as find the percentage change in sales that results from an incremental change in operations.

This study primarily claims that franchise locations with better educated workers have higher operational quality and that education level can be proxied by the quality of local schools. In other words, other factors being equal, a franchise location will have poorer operation scores than an identical franchise location in a geographical area with better school quality. This theory also suggests that an increase in the quality of education in an area will increase the operation/service scores of QSR franchises in same area. In brief, higher caliber local schools translate into better employees, more efficient operations, and higher sales.

In order to isolate the effects of the independent variable, education quality, there are numerous confounding factors to consider. To start, this study's ability to measure operation and service scores must be consistent and comprehensive. Customer experience ratings, corporate inspector ratings, customer complaints, and speed of service are among the variables that

franchisors use to measure their operational quality. These general metrics will capture operations in this analysis. Nonetheless, there are many factors impacting these metrics. This study will organize the factors driving operations into interior (occurring within a franchise) and exterior (occurring as a result of local market influences), to appropriately isolate the independent variable, school quality.

Many internal franchise factors will be marginalized because this study focuses on the same franchised brand. Regardless, to determine the operational success of a franchise, other internal factors within a franchise, such as its building/equipment, its franchisee operator, and its human capital (employees), can impact operations.[9] So, to manage differences in the building and the equipment, this study will control for the type of retail location, i.e., whether it is in a mall, airport, freestanding, etc. Different types of locations will require specific building composition, which could result in a difference of operations. Although the type of structure could affect the operations, this paper considers the age of the building be a larger determinant of sales revenue than a driver of operational quality. Next, franchisee effectiveness can be controlled by understanding the ownership of each location. Franchisees with more experience likely have a better understanding of how to run a franchise. It is also useful to note that size of the franchisee can impact their ability to micro-manage the operations of each location. Additionally, because there is considerable difference in skill level of each franchisee, they will inevitably vary in their operational output.[10]

[9] See the discussion of this topic in the Literature Review section, namely Kalnins and Mayer (2004).
[10] Studies have shown that these franchisee factors influences the survival of a franchise location; see Bates (1998), Williams (1999), and Blair and Lofontaine (2005) for specific examples.

The last internal factor to analyze, and this study's explanatory variable, is the level of human capital or worker education. Low-wage workers have an array of demographic characteristics: some are immigrants, some have never received a high school diploma, and some attend college and work part-time. Although it is almost impossible to fully capture the history and demographics of each worker within a given franchise location, this study will draw from past literature, noting low-wage workers' geographic mobility restrictions and franchisees' recruiting limitations, to assume that many—if not an overwhelming majority—of these workers were educated locally[11] and that educational quality can be measured through the ratings of the closest five schools geographically.[12] Thus, this paper averages school ratings from the five closest high schools to each franchise to measure and determine local school quality.[13]

Of course, it is difficult to isolate the quality of a school, especially with respect to income endogeneity and school composition bias.[14] Wealthier areas are likely to have better schools for a variety of reasons, and students in such schools often have far greater opportunities to develop their skills and benefit from their peers. This paper will address the composition bias in schools by using Texas high school accountability ratings as the explanatory variable. Accountability ratings are an index designed by the Texas Education Agency to isolate the quality of a school, that is, how much the school itself is accountable for its students' outcomes.

[11] See Literature Review discussion of the impact of low-income on mobility and franchise labor markets, namely Parcel and Sickmeier (1998) and Adams (2006).
[12] Franchises in rural locations would more likely have workers that are educated locally; however, in this dataset only 30 observations were classified as rural. Thus, it would analyzing only rural locations would not be a large enough sample. Additionally, the selection of five schools was decided to be appropriate by this analysis.
[13] When selecting the closest 5 high schools, this study only accounts for schools that are within a 5 mile radius of the given franchise location. Some school quality indexes therefore average fewer than 5 schools.
[14] See Lauder and Robinson (2002).

This index is measured on a scale of 1 to 4 and determined based on improvement in standardized test scores per student, improvement of *English Language Learners* students' test scores, dropout rates, completion rates, and increase in the number of commended students. Thus, because the index is following individual students over time, it can measure student improvement and exclude any inherent composition bias.

Beyond internal operations drivers, this paper attempts to capture external operations influences based on local demand (i.e., customers' expectation of service quality that impacts managers' decisions).[15] Locations with wealthier customers are likely to have a higher general expectation of speed and customer service. Consequently, franchisees in these areas might naturally have higher operations to compete with other brands in the area and/or satisfy their more-demanding customers. In this sense, the external pressures that might constitute higher operations can be controlled for through numerous variables. First, per capita income in the census tract can account for the basic level of wealth that might drive higher operations demands. Moreover, franchises that more regularly receive one-time customers (i.e., those that will only visit that store once) have the opposite demand effect. These franchises feel less pressure to have higher quality operations, because they likely will have fewer repeat customers. One way to capture this is to identify locations that are near major highways. These locations see many customers stopping off the highway that will likely never return to the same location. Lastly, to capture all other external factors, this study includes a DMA dummy variable.

There might also be an endogenous bias with external operational demand and education quality. For example, high quality schools are often the result of wealthy areas, because of the

[15] Note that these external demand factors influence the space between expectation and performance as explained in Zeithaml and Berry (1985).

composition bias. Likewise, franchise locations could have more efficient operations because their customers expect a high quality of service. These issues will be controlled for through the high school Accountability Ratings, which excludes possible composition bias, and through external demand variables including per capita income, proximity to a highway, and DMA. In short, this study matches each franchising location with the demographics of its area and uses the accountability ratings from the closest five high schools to measure education quality.

Thus, this regression controls for internal and external operations drivers to isolate the impact of the explanatory variable, accountability ratings (*AccRating*). With respect to internal operations driver, this study uses variables for the type of retail location (*Free_Stand*), to capture building/equipment differences and for the franchisee operator (*Franchisee_Dum*), to control for differences in franchisee skill, size, or experience. Conversely, to account for external operations drivers, this regression uses variables of the franchise locations proximity to a highway (*Near_HW*), the per capita income of the census tract (*Log_Income*), and a dummy variable for the Designated Market Area (*DMA_Dum*). Additionally, this regression uses the natural log of all variables that are continuous, that is, operations (*Log_Ops*) and per capita income (*Log_Income*). On the other hand, the variables for proximity to a highway, the franchisee, location type, and DMA are dummy variables. In addition this model uses standard error clustering, which allows for intragroup correlation between franchisees. The OLS model, for each franchise location *i*, is shown below (see Table 3 for further breakdown of the variables and Table 10-13 in *Appendix* for summary statistics).

$$Log\_Ops_i = \alpha + \beta_1 AccRating_i + \beta_2 Near\_HW_i + \beta_3 Log\_Income_i + \beta_4 Free\_Stand_i + \beta_5 DMA\_Dum_i + \beta_6 Franchisee\_Dum_i + \varepsilon_i (Franchisee\ Fixed\ Effects)$$

Table 3: Regression Variables for School Accountability Ratings Impact on Franchise Operations

Log_Ops	Natural log of operations scores comprised of speed of service, customer complains, and corporate inspector ratings
AccRating	Texas Education Agency average high school accountability rating for five closest schools
Near_HW	Variable = 1 if franchise location is within 2 miles of a major state or interstate highway
Log_Income	Natural log of per capital income in the census tract of the franchise location
Free_Stand	Variable = 1 if franchise location is a freestanding building (not in a retail strip)
DMA_Dum	Dummy variable for the Designated Market Area of the franchise location
Franchisee_Dum	Dummy variable for the franchisee operator

Thus, this model will show the significance of school accountability ratings on franchise location operations and the impact of a one-rating increase in school accountability rating on operations.

Because the primary dependent variable of this study is an index, it is useful for further analysis to break operations (*Log_Ops*) down into its components, to see the impact each has on sales, as well as the impact school quality has on each component. Therefore, using the same regression logic as the previous models, this study will replace operations with its four components: customer experience ratings (*Log_CustRate*), corporate inspector ratings (*Log_CorpInspRate*), customer complaints (*Log_CustComplaints*), and speed of service (*Log_SoS*).[16] Specifically, higher customer experience ratings, higher corporate inspector ratings, fewer customer complaints, and a lower speed of service variable, which indicates faster

[16] Note that the speed of service variable (SoS) is specific to locations with drive-thru and is calculated as the total time to serve the drive-thru line divided by the total number of customers in the drive-thru.

service, constitute a higher operations index. The OLS regression for operations on sales revenue for each franchise location *i* is shown below.

$$Log\_Sales_i = \alpha + \beta_1 Log\_CustRate_i + \beta_2 Log\_CorpInspRate_i + \beta_3 Log\_CustComplaints_i + \beta_4 Log\_SoS_i + \beta_5 Near\_HW_i + \beta_6 Remodel_i + \beta_7 Free\_Stand_i + \beta_8 Log\_Income_i + \beta_9 DMA\_Dum_i + \varepsilon_i (Franchisee\ Fixed\ Effects)$$

The OLS regression for school quality on the various operations components for each franchise location *i*, are shown below (see Tables 4 for the breakdown of each of these components and Table 10-13 in *Appendix* for summary statistics). This regression is run on the four operations component separately (*CustRate*, *CorpInspRate*, *CustComplaints*, and *SoS*).

$$Log\_(Operations\ Component)_i = \alpha + \beta_1 AccRating_i + \beta_2 Near\_HW_i + \beta_3 Log\_Income_i + \beta_4 Free\_Stand_i + \beta_5 DMA\_Dum_i + \beta_6 Franchisee\_Dum_i + \varepsilon_i (Franchisee\ Fixed\ Effects)$$

Table 4: Breakdown of Operations Components Variables

Log_CustRate	Natural log of customers ratings based on their experience visiting the franchise
Log_CorpInspRate	Natural log of ratings given to the franchise's quality of operatsions by corporate inspectors
Log_CustComplaints	Natural log of customer complains called in to the franchise or filled out on surveys
Log_SoS	Natural log of the speed of service, or the time it takes to serve a set number of customers in the drive thru line

Thus, these models will show the significance of each operations metric on sales revenue, as well as the impact of school accountability ratings on each of them.

DATA

The franchising data come directly from a specific franchise brand. This proprietary data set includes information such as physical address, building type, franchisee ownership, sales and

operation scores. The data on school quality (i.e., test scores, accountability ratings, etc.) come from the Texas Education Agency website[17] and is supplemented with National Center for Education Statistics.[18] This dataset contains physical address, school demographics, and other descriptive school data. School and franchise information is supplemented with census block data obtained from the U.S. Census Bureau website by tract, such as per capita income, population, race, worker class, education levels, nationality, and housing statistics.[19] Last, this study uses geocode maps from the U.S. Department of Transportation Federal Highway Administration website[20] and from ArcGIS maps, to geographically match franchise locations with schools and census tracts.

Findings

This paper first shows that higher operations scores have a significant and positive impact on sales revenue. The first regression demonstrates the significance of operations on sales of a given franchise (see Table 5 for results).

[17] The Texas Education Agency Accountability Ratings data download website link is at http://ritter.tea.state.tx.us/perfreport/account/.
[18] The NCES website link is at https://nces.ed.gov/.
[19] The U.S Census Bureau Data website is at http://www.census.gov/main/www/access.html.
[20] The U.S. Department of Transpiration Federal Highway Admin website is at http://www.fhwa.dot.gov/planning/processes/tools/nhpn/.

Table 5: OLS Regression Results of the Impact of Operations on Sales Revenue

VARIABLES	Log_Sales
Log_Ops	0.196***
	(0.0557)
Near_HW	-0.0376
	(0.0548)
Remodel	0.144***
	(0.0320)
Log_Income	-0.0147
	(0.0397)
Free_Stand	0257
	.0321)
DMA_dum	Varies
	(Varies)
Constant	13.20***
	(0.515)
Observations	465
R-squared	0.391

Robust standard errors clustered by franchisee in parentheses
*** p<0.01, ** p<0.05, * p<0.1T

While controlling for DMA, this regression shows that a 10% increase in the operations (*Log_Ops*) of a franchise location have a 1.89% increase on sales revenue of that location, statistically significant at a 99% confidence interval.[21] Additionally, it shows that locations that are remodeled have 15.49% higher sales than location that are not remodeled, statistically significant at a 1% level.[22] While there might be some omitted variable bias in this model, it demonstrates that franchises in the same market that have higher operations also have higher sales revenue. In short, this demonstrates that operations are important to the primary goals of a franchise; they have a significant impact on sales.

[21] The increase in sales due to operations is calculated $1.1^{0.196}$=1.0189.
[22] The increase in sales for remodels is calculated $e^{0.144} = 1.1549$.

Table 6: OLS Regression Results of the Impact of School Quality on Franchise Operations

VARIABLES	Log_Ops
AccRating	0.0746***
	(0.0195)
Near_HW	-0.0252
	(0.0204)
Log_Income	0.0456
	(0.0345)
Free_Stand	0.0366
	(0.0292)
DMA_Dum	Varies
	(Varies)
Franchise_Dum	Varies
	(Varies)
Constant	3.807***
	(0.426)
Observations	465
R-squared	0.364

Robust standard errors clustered by franchisee in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 shows that higher school quality ratings (*AccRating*) have a significant and positive effect on operations scores of a franchise. A one-level ratings increase (on a scale of 1-5) of school accountability ratings will increases the operations scores (*Log_Ops*) of the local franchises by 7.75%.[23] Because this model controls for exterior demand drivers, these results suggest that local schools capture employee education and that better educated employees translate into higher operations scores. Therefore, employee education is shown to be a significant driver of operations based on the model of this paper. Better quality local schools signify better workers for local franchises and, accordingly, better operations.

Needless to say, the importance of school quality ratings on operations of franchises is

[23] The increase in operations due to school ratings is calculated $e^{0.0746} = 1.0775$.

based on the assumption that workers have low geographic mobility and were thus educated locally. It is also important to note that many of the DMA and Franchisee dummy variables are statistically significant, which suggests that market forces and/or the franchisee have a significant impact on operations. Regardless, these results demonstrate that the quality of education in an area has a positive—or negative—impact on the operations of QSR franchises, likely through its employees.

Table 5 and Table 6 establish operations' importance in determining the sales of a franchise and demonstrate that the quality of schools near a franchise has a significant impact on that franchise's operations. These results suggest that better educated employees translate into higher operations scores, which, in turn, lead to higher revenues. For further analysis of the driving factors of this relationship, this paper examines the four components of the operation index: customer experience rating (*Log_CustRate*), corporate inspector ratings (*Log_CorpInspRate*), customer complaints (*Log_CustComplaints*), and speed of service (*Log_SoS*). The correlations between these variables and operations scores are shown in Table 7.

Table 7: Correlations Between Operations Components

	Log_Ops	**Log_CustRa**	**Log_CrpInR**	**Log_CustC**	**Log_SoS**
Log_Ops	1.00				
Log_CustRa	0.34	1.00			
Log_CrpInR	0.59	0.15	1.00		
Log_CustC	-0.58	-0.07	-0.08	1.00	
Log_SoS	-0.11	0.35	-0.05	0.25	1.00

As expected, the components of operations have varying degrees of correlation, but none merit endogeneity concerns. Additionally the direction of each correlation is intuitive. Higher customer experience ratings (*Log_CustRate*) correlates with higher operations scores, as does higher corporate inspector ratings (*Log_CorpInspRate*). On the other hand, more customer complaints (*Log_CustComplaints*) negatively correlates with operations scores, customer ratings, and corporate inspector ratings. Speed of service (*Log_SoS*) has a negative correlation with certain variables, but a positive correlation with others. Higher speed of service, which is calculated as the time to serve the drive-thru line divided by total drive-thru customers, signifies slower service and is thus negatively correlated with operations scores and corporate inspector ratings and is positively correlated with customer complaints. Conversely, slower service is positively correlated with higher customer ratings. This positive correlation could exist because, in general, locations with more customers have slower service due to higher traffic inside the building. Thus, slower service (i.e., a higher SoS variable) may implicitly signify more total customers. Additionally, locations with more customers likely get higher customer ratings, which could explain the positive correlation between speed of service and customer ratings.

The results from the regressions of operations components on sales and school quality on each operations component are shown in Table 8 and Table 9.

Table 8: OLS Regression Results of the Impact of Operations Components on Sales

VARIABLES	(1) Log_Sales
Log_CustRate	0.175** (0.0760)
Log_CorpInspRat	0.312* (0.180)
Log_CustCompla	-0.137** (0.0532)
Log_SoS	0.0964*** (0.0185)
Near_HW	-0.0262 (0.0419)
Remodel	0.137*** (0.0260)
Log_Lncome	-0.00781 (0.0374)
DMA Dum	Varies (Varies)
Constant	12.15*** (0.408)
Observations	463
R-squared	0.489

Robust standard errors clustered by franchisee in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Based on the breakdown of the *Log_Ops* operations variable into its four components of *Log_CustRate*, *Log_CorpInspRate*, *Log_CustComplaints*, and *Log_SoS*, this paper finds that all four components have significant impacts on sales. Thus, a 10% increase in customer ratings appears to result in a 1.68% increase in sales. Although higher customer ratings probably do not draw more customers like favorable restaurant reviews do, they do portray overall satisfaction which implies higher customer frequency or preference for that location. A 10% increase in corporate inspector ratings appears to result in a 3.02% increase in sales. Similar to customer ratings, corporate inspector ratings capture the overall quality of the franchise that would likely

be highly correlated with sales. It is also feasible that inspectors might be biased towards franchises that they know have higher sales and inherently give those locations higher ratings.

Conversely, a 10% increase in customer complaints corresponds to a 1.297% decrease in sales. Franchises with more customer complaints likely lack characteristics that make customers want to return. In this sense, customer complaints likely serve in the opposite manner as customer ratings and represent a lack of service quality. A 10% increase in the speed of service (*SoS*) variable corresponds to a 0.92% increase in sales.[24] While this result seems counter-intuitive, since an increase in the speed of service variable represents slower (i.e., poorer) service, it could be explained simply by franchises with more customers. In other words, locations with more customers will have slower service speed, but higher sales.

[24] The change in sales for each component, respectively, is calculated $1.1^{0.175} = 1.01682, 1.1^{0.312} = 1.03018, 1.1^{-0.137} = 0.98702, 1.1^{0.0964} = 1.00923$.

Table 9: OLS Regression Results of the Impact of School Quality on Ops Components

VARIABLES	(1) Log_Ops	(2) Log_CustRate	(3) Log_CorpInspRate	(4) Log_CustComplaints	(5) Log_SoS
AccRating	0.0746***	0.0422	0.00820	-0.103***	-0.176
	(0.0195)	(0.0442)	(0.0133)	(0.0334)	(0.120)
Near_HW	-0.0252	0.0263**	-0.0225**	0.0353	-0.0969
	(0.0204)	(0.0120)	(0.0100)	(0.0393)	(0.127)
Log_Income	0.0456	-0.0102	0.0297	0.0450	0.0127
	(0.0345)	(0.0511)	(0.0188)	(0.0412)	(0.0791)
Free_Stand	0.0366	0.00627	0.0257	0.0681	0.0115
	(0.0292)	(0.0325)	(0.0175)	(0.0633)	(0.168)
DMA_Dum	--	--	--	--	--
Franchisee_Dum	--	--	--	--	--
Constant	3.807***	5.751***	1.346***	0.0478	7.883***
	(0.426)	(1.738)	(0.181)	(0.480)	(2.436)
Observations	465	463	465	465	465
R-squared	0.364	0.598	0.345	0.305	0.441

Robust standard errors clustered byfrranchisee in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In total, operations prove to be important, because every operational component is a significant driver of sales revenue. As shown in Table 9, however, school accountability ratings (*AccRating*) primarily impact operations by reducing customer complaints. As described in many studies, non-cognitive skills have a significant impact on school outcomes, and it is likely that non-cognitive skills (i.e., personality traits and intrapersonal skills) account for a worker's ability to please customers.[25] Employees with strong non-cognitive skills have better communication, organization, and perception abilities. Thus, employee non-cognitive skills which are captured in the school accountability ratings have a significant impact on the number of customer complaints. This model's results demonstrate that a one-level increase in school

[25] See Naemi, Burrus, Kyllonen and Roberts (2012), Farrington, Roderick, Allensworth, Nagaoka, Keyes, Johnson, and Beechum (2012), and Heckman, Stixrud, and Urzua (2006) for non-cognitive skills studies.

accountability rating corresponds with a reduction in customer complaints by -9.79%, which is statistically significant at a 1% level.[26] Although one might assume that an area with better education (and thus better educated customers) would demand higher standards of service, and thus more customer complaints, these results suggest that local education quality has a stronger impact on the ability of employees to meet customer needs than on the customers' expectations of service. In short, school quality translates in higher operations scores, primarily through the customer complaint component.

Conclusion

While we expect franchises of the same brand to have a similar level of operational efficiency and product quality, due to standardized equipment and processes, there are still differences from location to location. It may be that franchisees vary in their ability to train and monitor employees. Because this regression includes a franchise fixed effects, however, such differences cannot explain the variation in operations scores. A remaining driver of these operational differences could be the employees of each franchisee. This study uses quality ratings of nearby local high schools to measure worker education of the franchise locations. The study's results are based on the assumptions that the ability of employees depends in part on their education and that low-wage workers are likely educated in local schools, because of their geographic mobility restrictions.

This study considers an OLS regression model that plots sales against operations scores (see Table 5) and operations against school quality ratings, while controlling for internal and external operations drivers (see Table 6). It finds that better education of franchisee employees,

[26] The decrease in customer complaints due to school ratings is calculated $e^{-0.103} = 0.90213$.

as approximated by school accountability ratings, has a significant and positive impact on operations, which in turn has a significant and positive impact on sales. Specifically, school accountability proved to significantly reduce the customer complaints component of operations (see Table 9). These results reinforce the importance of high-caliber operations and, specifically, of well-educated employees. They suggest that the most important aspect of franchisee workers' education is improved non-cognitive skills. In the end, franchises near better schools have an advantage by having a better educated labor pool. Thus, this paper demonstrates, once again, that higher quality employees are the building blocks of successful businesses.

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Appendix

Table 10: Summary Statistics for Continuous Variables

Variable	Mean	Std. Dev.	Min	Max
Sales Revenue	1,113,761	365,984.4	100,852	3,108,676
Operations	65.86	15.66	25.25	96.17
Cust. Compls.	1.1172	.8918	0	5.9387
Mean Income	25,858.27	11,454.23	3,745	78,879
***AccRating**	2.4264	.2468	2	3.45

*note that accountability ratings are an average among the five closest schools that are within a 5 mile radius

Table 11: Summary Statistics for Discrete Variables

Variable	= 0	= 1
Near_HW	109	356
Remodel	370	95
Free_Stand	103	362

Table 12: Breakdown of Dummy Variables for DMA

DMA number	Observations in DMA	Percentage
DMA 1	4	0.86
DMA 2	3	0.65
DMA 3	8	1.72
DMA 4	22	4.73

DMA 5	7	1.51
DMA 6	11	2.37
DMA 7	95	20.43
DMA 8	26	5.59
DMA 9	138	29.68
DMA 10	10	2.15
DMA 11	11	2.37
DMA 12	37	7.96
DMA 13	6	1.29
DMA 14	3	0.65
DMA 15	38	8.17
DMA 16	8	1.72
DMA 17	17	3.66
DMA 18	2	0.43
DMA 19	16	3.44
DMA 20	3	0.65

Table 13: Breakdown of Dummy Variables for Franchisees

Franchisee number	**Observations**	**Percentage**
Franchisee 1	2	0.43
Franchisee 2	1	0.22
Franchisee 3	3	0.65

Franchisee 4	18	3.87
Franchisee 5	2	0.43
Franchisee 6	4	0.86
Franchisee 7	15	3.23
Franchisee 8	2	0.43
Franchisee 9	16	3.44
Franchisee 10	93	20
Franchisee 11	2	0.43
Franchisee 12	4	0.86
Franchisee 13	7	1.51
Franchisee 14	6	1.29
Franchisee 15	39	8.39
Franchisee 16	2	0.43
Franchisee 17	3	0.65
Franchisee 18	2	0.43
Franchisee 19	1	0.22
Franchisee 20	2	0.43
Franchisee 21	3	0.65
Franchisee 22	3	0.65
Franchisee 23	4	0.86
Franchisee 24	11	2.37
Franchisee 25	2	0.43

Franchisee 26	6	1.29
Franchisee 27	1	0.22
Franchisee 28	18	3.87
Franchisee 29	1	0.22
Franchisee 30	1	0.22
Franchisee 31	3	0.65
Franchisee 32	13	2.8
Franchisee 33	74	15.91
Franchisee 34	1	0.22
Franchisee 35	1	0.22
Franchisee 36	1	0.22
Franchisee 37	36	7.74
Franchisee 38	4	0.86
Franchisee 39	9	1.94
Franchisee 40	18	3.87
Franchisee 41	5	1.08
Franchisee 42	1	0.22
Franchisee 43	1	0.22
Franchisee 44	2	0.43
Franchisee 45	21	4.52
Franchisee 46	1	0.22