Examining marketing and operations management as a competitive advantage in the National Football League

Mark D. Heileman
Rollins College
mheileman@rollins.edu
Adrian J. Mayer
Rollins College
Timothy L. Pett
Rollins College

Abstract
Research on competitive advantage suggests when firms are able to recognize and exploit their marketing and value-chain, they outperform others. This paper evaluates the NFL using a process value-chain and marketing strategy approach between the league and franchise owners. Analytic assessment indicates significant findings supporting a number of research hypotheses.

Keywords: Competitive Advantage, Value-chain, Home Advantage.

INTRODUCTION

The purpose of this paper is to empirically examine the marketing and operations management (or production) elements in the product/service value-chain as a competitive advantage in the National Football League (NFL).

> *In team sports, the term home advantage describes the benefit that the home team is said to gain over the visiting team as a result of playing in familiar facilities and in front of supportive fans. There are many causes that attribute to home advantage, such as crowd involvement, travel considerations, and environmental factors. The most commonly cited factors of home advantage are usually factors which are difficult to measure, and thus even their existence is debated. Most of these are psychological in nature: the home teams are familiar with the playing venue; they can lodge in their homes rather than in a hotel, and have less far to travel before the game; and they have the psychological support of the home fans. Other factors, however, are easier to detect and can have noticeable effects on the outcome of the game. In the NFL, for instance, the crowd often makes as much noise as it can when the visiting team is about to run a play. This can make it very difficult for the visiting team's quarterback to call audible play changes, or for any player to hear the snap count. In contrast, the crowd is*

> *often quiet while the home team is on offense, and that enables the quarterback to use the hard count intended to draw the defense offsides as the defense can hear the hard count. Environmental factors such as weather and altitude are easy to measure, yet their effects are debatable, as both teams have to play in the same conditions; but the home team may be more acclimated to local conditions with difficult environments, such as extremely warm or cold weather, or high altitude (e.g., Denver Broncos)* (Christensen 2012).

Research Question

Research Question: Is the NFL able to govern competitive advantage (or home advantage) via the marketing and operations management (or production) elements in the league's product/service value-chain?

Significance of the Study

Chadwick (2009), referring to the development of league competitiveness as an understudied academic topic, stated the need for additional studies on "how games, leagues, competitions and tournaments can be managed to ensure that uncertainty, balance, and, indeed, equity are promoted."

Background Information

To create goods and services, all organizations perform three functions. They are:

1. *Marketing*, which generates the demand, or, at least, takes the order for a product or service.
2. *Production/operations*, which creates the product.
3. *Finance/accounting*, which tracks how well the organization is doing, pays the bills, and collects the money.

Through the three functions – marketing, operations, and finance – value for the customer is created (Render & Heizer, 2014).

Marketing is about communicating the value of a product, service, or brand to customers or consumers for the purpose of promoting or selling that product, service, or brand (Kotler & Keller, 2009).

The management process consists of planning, organizing, staffing, leading, and controlling. Operations managers apply this management process to the decisions they make in the operations management function (Render & Heizer, 2014).

Value-chain analysis is used to identify activities that represent strengths, or potential strengths, and may be opportunities for developing a competitive advantage. These are the areas where the firm adds its unique value through product research, design, human resources, supply chain management, process innovation, or quality management. Value-chain analysis is a way to identify those elements in the product/service chain that uniquely add value (Porter 1985).

> *Perhaps nowhere is the concept of competitive advantage more apparent than in the multi-billion dollar industries of professional sports. Here, resource acquisition, effective strategy, and management spell the difference between*

competitive success and mediocrity, making these industries prototypes for studies of industrial policy and resource-based strategy. Data from professional and collegiate athletics have proven to be a useful and insightful venue for many academics for at least two reasons. First, the use of sports data has been demonstrated to be a valid measure of performance, or used more generically as productivity indicants or outcomes. There is some disagreement over specifically which statistics provide the most appropriate information for the given research circumstances and objectives, and it seems apparent that this information is valid, useful, and readily available. Second, athletics provides a fertile ground for the study of many of the issues of scholarly interest today, such as team formation and development, the interdependence of individuals and groups, effective leadership, resource management, and the implementation of strategic goals through compensation (Carey 2008).

Literature Review

Football is one of the most beloved American sports pastimes. Avid fans follow their favorite teams whether those teams win or lose. The NFL is worth billions of dollars. While the exact amount is not known, Forbes reports that at least 20 out of the 32 teams are worth more than $1 billion (Pellegrino 2013). The following figure defines the product/service value-chain that drives value for the league (Haswell et al. 2012).

Figure 1 – The NFL Value-chain.

Research continues to illustrate the complexity of the home advantage. From an overall perspective, the home advantage appears to be universal across all types of sports. However, it is not universal across all teams in those types of sports; there are a substantial number of teams that do not show a home advantage. Also, from a causal perspective, it is likely that the *why* of

the home advantage is equally complex – possibly varying from sport to sport and even team to team (Carron, Loughhead, & Bray, 2005).

Home teams win over 50% of sporting contests. The sociological appeal of this is the assumption that home advantages are partly the result of the support fans provide, with the collective inspiring teams to performances above normal achievements. Recent changes in professional sports suggest that home support may not be as strong as once expected as structural conditions producing the home advantage have shifted. Distancing of players from fans via free agency and rapid salary escalation, coupled with marketing designed to create national publics, can produce declines in the home advantage (Smith 2003).

In business, the ultimate goal for the management of a for-profit corporation is to maximize the wealth of the shareholders (Block, Hirt, & Danielsen, 2011). In general, for league sports to be financially successful, Rottenberg (1956) advanced the concept that each team in the league needed to be successful. For this to occur, each team also needed to be of roughly equal capacity. Rottenberg referred to this as the uncertainty of outcome hypothesis. The implication of this hypothesis within league sports is that not only will interest in teams that lose year after year wane, but fan interest in winning teams will also diminish (Lee 2009). Neale (1964) introduced the Louis-Schmeling paradox, named after boxing legends Joe Louis and Max Schmeling. Neale argued that the only way Louis could make a living from boxing was if there was competition and that the competition had to be good enough to make fans uncertain about the outcome of the fight. This paradox holds true in league sports today.

Individual teams want to dominate the other teams in the league, but in doing so they may actually diminish the overall league attractiveness to the fan. Based on the Louis-Schmeling paradox (Neale 1964), league management must act to maintain an acceptable level of competitiveness, for the fans, within the league, while each team attempts to maximize its winning percentage or earn the most points.

Neale (1964) further stated that the way the league kept the interest of the public was through the media publishing the league standings. The excitement of a pennant race in baseball was created through daily (frequently) updated newspaper standings, and the "tighter" the race the more free publicity the pennant race would create, which in turn would create more fan excitement. Neale's article was published decades before 24-hour sports television programming, and the Internet would make live updating of league standings possible.

Neale (1964) next addressed competitive balance in league sports. He developed a premise that the Louis-Schmeling paradox also applied to team sports such as baseball, within a league through a phenomenon he referred to as the "league standing effect." According to Neale, the more frequent the changes in league standings, coupled with the closeness of the teams within the standings, the more excitement is generated. The parallel between the league standing effect and the Louis-Schmeling paradox is that within a league sport, the best teams also need strong competition. In leagues where an uncompetitive balance exists, fan interest in the weakest teams may wane, which in turn will negatively impact the revenues of the stronger teams (Humphreys 2002; Neale 1964).

Hypotheses

The following null hypotheses were derived in order to address the research question:

Hypothesis 1 (H1): There is no home advantage in a NFL football game.

Hypothesis 2 (H2): The home advantage is constant throughout a NFL football game.
Hypothesis 3 (H3): The NFL is not achieving competitive parity (marketing strategy) via seasonal rule changes (process improvement) which are manifested by penalty count/yards.

METHODS, ASSUMPTIONS, AND PROCEDURES

A database containing play-level and game-level data for NFL seasons 2000 through 2014 was obtained from ArmchairAnalysis.com. The use of the data was licensed by ArmchairAnalytics.com under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 license. A sample of games from each season was compared to the official NFL box scores to verify the accuracy of the obtained database. Playoff games, pre-season games, and games not played at the designated home field for the team listed as the home team by the NFL in the official box score were omitted from the analysis.

For H1 (there is no home advantage in a NFL football game), a paired-samples t-test was used to determine if the mean difference between the home team final score and the visiting team final score for each game during a season was significantly different. A negative value would indicate a bias in favor of the visiting team, a positive value would indicate an outcome in favor of the home team. The value, if significant, would be the strength of the advantage. Additionally, an overall composite number was calculated, using each game for all fifteen seasons, reported in aggregate.

If H1 is rejected and home advantage is statistically established, then a repeated measures analysis of variance (ANOVA) test may be used for H2 (the home advantage is constant throughout a NFL football game) to calculate whether the home advantage was equally distributed throughout the game. For this test, the scoring by quarter for each home team, of every NFL game, over fifteen years, was tested against the scoring of the visiting team.

In H3 (the NFL is achieving competitive parity (marketing strategy) via seasonal rule changes (process improvement) which are manifested by penalty count/yards), when investigating potential on-field results that arise from the league's marketing efforts, we looked at both penalties called and penalty yards assessed. Penalties called included both accepted and declined penalties. Penalty yards assessed only included actual game yardage lost by a team resulting from accepted penalties.

Given that competitive balance in professional league sports is ideal for maximizing league revenue, the NFL's marketing strategy is essentially "competitive parity." Processes that govern the competitive nature of football games, such as salary cap, game rules, and partnership arrangements (e.g., television contracts, merchandise), are the scope of concern for the NFL league office and management council. Every rule change is essentially marketing strategy. Rule changes could be expressed in penalty count/yards in order to make the league more marketable.

RESULTS AND DISCUSSION

H1: There is no home advantage in a NFL football game. The outcomes for each of the fifteen individual seasons appear in Table 1. This result reports the outcome for the aggregate finding. The home team's scored more points (*mean* = 22.94, *std dev* = 10.435) as opposed to the visiting team's (*mean* = 20.31, *std dev* = 10.168). The scoring difference represents a home advantage of 2.628 points per game, 95% confidence interval [2.155, 3.102]. The home

advantage elicited a statistically significant difference from zero, $t(3,800) = 10.884$, $p < 0.0005$. Therefore, the null hypothesis is rejected. Over this same period of time, the home team won 57.3% of the games, the visiting team winning 42.7% of the games (five games ended in a tie during this period. Half a win was attributed to each the home and visiting team for purposes of this calculation).

Table 1 – Results for Yearly Differences Between Home versus Visitor Team Final Scores (Home Advantage).

Year	Mean	Std Error Mean	*df*	*t*-value
2000	2.823	0.940	247	3.004**
2001	2.000	0.895	247	2.234*
2002	2.246	0.879	255	2.554*
2003	3.631	0.928	254	3.914***
2004	2.508	0.877	255	2.859**
2005	3.677	0.921	253	3.992***
2006	0.848	0.901	253	0.940
2007	2.890	0.968	254	2.986**
2008	2.610	0.962	253	2.712**
2009	2.358	1.031	253	2.288*
2010	2.079	0.943	251	2.205*
2011	3.224	0.954	253	3.380***
2012	2.732	0.964	253	2.834**
2013	3.253	0.885	252	3.667***
2014	2.544	0.978	251	2.602**

** $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.*

H2: The home advantage is constant throughout a NFL football game. Mauchly's test of sphericity suggested that the assumption of sphericity had been violated, chi-squared (χ^2) = 133.809, $p < 0.0005$. While Mauchly's test of sphericity is a standard measure, Maxwell and Delaney (2004) endorse that an unadjusted Mauchly's test never be used, in part due to the high level of sensitivity of the one-way repeated measures ANOVA, causing departures from sphericity. They advise not interpreting Mauchly's test of sphericity and instead, using the Greenhouse-Geisser correction. Earlier work by Kesselman et al. (1980) found that when studies

had large samples (N = 3,798 in this study), Mauchly's over accounted for them, and Weinfurt (2000) found that sphericity was difficult not to violate. Therefore, the Greenhouse-Geisser correction epsilon was used for this study. Epsilon (ε) was 0.977, as calculated according to Greenhouse and Geisser (1959), and was used to correct the one-way repeated measures ANOVA. The home advantage was statistically significantly different during the various quarters throughout the NFL games over the 15-year study, $F(2.932, 11{,}142.830) = 5.086$, $p = 0.001$. Therefore, H2, that home advantage is equal throughout the game is rejected. While important to note the issue regarding sphericity, whether sphericity was assumed or the Greenhouse-Geisser correction was applied, the F and p values for this one-way repeated ANOVA were identical.

Table 2 – Results for Total Differences between Home versus Visitor Team Quarter and Half Scores (Home Advantage).

Quarter	Mean	Std Dev	Greenhouse-Geisser	Half	Mean	Std Error	*t*-value
1st	0.872[a]	0.113	$F = 5.086$ (0.001)	1st	1.777	0.179	9.919***
2nd	0.905[b]	0.136					
3rd	0.360[a,b]	0.114		2nd	0.851	0.162	5.256***
4th	0.483	0.122					

*N = 3801 games over 15 years; [a] differences between Quarter 1 and 3; [b] Quarter 2 and 3; ** p < 0.01; *** p < 0.001.*

H3: The NFL is not achieving competitive parity (marketing strategy) via seasonal rule changes (process improvement) which are manifested by penalty count/yards. The outcomes for each of the fifteen individual seasons appear in Table 3. This result reports the outcome for the aggregate finding comparing home team total yards penalized versus visiting team total yards penalized per game. Also reported is the aggregate per game comparison of the total number of penalties called (both accepted and declined) against the home team versus the away team. Both comparisons looked at each game over the fifteen years included in the study.

The results of the paired t-test for yards penalized indicated the home team was penalized less per game (*mean* = 50.36, *std dev* = 25.514) as compared to the visiting team's (*mean* = 53.45, *std dev* = 26.805). The penalized yardage difference represents a -3.09 yard advantage in favor of the home team, 95% confidence interval [-4.148, -2.020]. The advantage to the home team, by being sanctioned with less penalty yards elicited a statistically significant difference from zero, $t(3{,}830) = -5.683$, $p < 0.0005$. Therefore, the null hypothesis is accepted. At the same time, in each game, we found the home team had less total number of penalties called against it (*mean* = 7.07, *std dev* = 3.051) compared to the visiting team (*mean* = 7.55, *std dev* = 3.219). This represents the home team having -0.48 (0.48 less) penalties called against them during a game, 95% confidence interval [-0.606, -0.359]. This number is statistically significant in favor of the home team, $t(3{,}830) = -7.655$, $p < 0.0005$.

Table 3 – Yearly Differences between Home versus Visitor Number of Penalty Yards and Number of Penalties Called (Marketing).

Year	Dimension	Mean	Std Error Mean	*t*-value
2000	Penalty Yards Number of Penalties	0.637 -0.315	2.205 0.240	0.289 -1.308
2001	Penalty Yards Number of Penalties	-6.536 -0.738	2.190 0.242	-2.984** -3.044**
2002	Penalty Yards Number of Penalties	-6.000 -0.395	2.108 0.245	-2.847** -1.609*
2003	Penalty Yards Number of Penalties	-2.839 -0.800	2.052 0.232	-1.384 -3.449***
2004	Penalty Yards Number of Penalties	-6.035 -0.902	2.030 0.243	-2.973** -3.712***
2005	Penalty Yards Number of Penalties	-5.429 -0.854	2.161 0.272	-2.513* -3.137**
2006	Penalty Yards Number of Penalties	-2.598 -0.438	1.873 0.226	-1.387 -1.937*
2007	Penalty Yards Number of Penalties	-5.565 -0.773	1.992 0.242	-2.793** -3.197**
2008	Penalty Yards Number of Penalties	3.236 0.098	1.966 0.240	1.646 0.410
2009	Penalty Yards Number of Penalties	-1.323 -0.370	2.135 0.234	-0.620 -1.258
2010	Penalty Yards Number of Penalties	2.098 0.137	2.202 0.260	0.953 0.525
2011	Penalty Yards Number of Penalties	-2.193 -0.307	2.057 0.246	-1.066 -1.248
2012	Penalty Yards Number of Penalties	-4.264 -0.502	1.994 0.241	-2.139* -2.083*
2013	Penalty Yards Number of Penalties	-4.708 -0.549	2.182 0.252	-2.157* -2.184*
2014	Penalty Yards Number of Penalties	-4.361 -0.498	2.287 0.239	-1.907* -2.082*

** $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.*

CONCLUSIONS AND RECOMMENDATIONS

The overriding purpose of this study was to determine if the NFL is able to govern competitive advantage (or home advantage) via the marketing and operations management (or

production) elements in the league's product/service value-chain. Three null hypotheses were derived in order to address the research question. Fifteen seasons of league performance data were obtained to test the hypotheses. This section reports the conclusions and recommendations that resulted from this study.

The following conclusions result from testing the three study hypotheses at the 95% confidence level:

Reject H1: there is no home advantage in a NFL football game. There is statistically significant evidence there is a home advantage in a NFL football game.

Reject H2: the home advantage is constant throughout a NFL football game. There is statistically significant evidence that home advantage is more predominant in the first half than in the second half of a NFL football game.

Accept H3: the NFL is not achieving competitive parity (marketing strategy) via seasonal rule changes (process improvement) which are manifested by penalty count/yards. There is statistically significant evidence that the home team has less penalties (count/yards) called against them during a NFL football game.

Limitations

The limitations of this study are the constraints on generalizability, applications to practice, and/or utility of findings that are the result of the ways in which we initially chose to design the study. In this study we investigated one professional sports league, specifically the NFL, which has been defined as a "cartel" of 32 independent businesses (Supreme Court, 2010). Only one dimension of marketing was evaluated which involved using penalty count/yards as a proxy for rule changes (or process improvement).

Future Research

In this study, we have sought to respond to a research question regarding the NFL's ability to govern competitive advantage (or home advantage) via the marketing and operations management (or production) elements in the league's product/service value-chain. Our study, being of an exploratory and interpretive nature, raises a number of opportunities for future research. More research will, in fact, be necessary to refine and further elaborate our original findings, and to specifically address the study limitations discussed above. Additional research questions of interest include:

- Do television timeouts affect scoring (or the momentum) within an NFL game?
- How can the NFL control total game time?

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