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Perception, reality, and the adoption of business analytics: Evidence from North American professional sport organizations

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ABSTRACT

It is well known that professional sports teams have made extensive use of analytics to improve their on-field performance. However, it is not as apparent that these same organizations use analytics to improve performance on the “business” side. The North American professional sports industry is unique in that the teams operate as legal monopolies/duopolies, with very few cities having more than one major-league team in a particular sport. Thus, our intent is to explore the adoption and assessment of business analytics in professional sports organizations. An empirical analysis is conducted concerning management's perception of the effects of business analytics as well as the actual change in financial performance since the adoption of analytics by the organizations.

1. Introduction

Perhaps owing to the success of the best-selling book, *Moneyball* [31], and the subsequent film released in 2011, there has been a resurgence of interest in sport analytics. Professional sports teams are using data to drive decisions about player acquisition, development, and in-game tactics in order to gain competitive advantage on the field [13,20,24,42]. This interest extends to the academic world as well. In recent years, operations research journals have devoted more coverage to this topic, but with an eye towards scheduling events and on-the-field results; however, the use of analytics in the business operations of professional sports organizations is relatively neglected in the academic literature.

Business analytics has been defined as “the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact based management to drive decisions and add value” ([9], p. 3). The proliferation of analytics by businesses to assess risks and make decisions has been well documented (for recent examples, see [3,28,24,35]; and [33]). The rise of corporate investments in analytics allows management to make more informed decisions [7]; however, there is ambiguity around these investments. Academic literature reveals tension between perception and reality regarding the adoption of management strategies. Managers may adopt analytics and perceive them to be more beneficial to the organization than actual outcomes indicate. Such adoption may be mere imitation of the behaviors of other successful organizations to bestow legitimacy on managers and their firms [12], but may not in fact enhance revenues or profits.

The intent of this paper, then, is to explore the adoption and assessment of business analytics tools in the North American professional sports industry. The use of analytics is widely viewed as an essential tool in not only improving customer service but generating incremental revenue. We view the use of these tools as a firm-level strategic decision designed to enhance the quality of customer marketing. Previous research has noted that an analytic strategy is based on information systems [49] and entails identifying profitable segments of the customer population that have been previously neglected [7]. Although numerous industries use analytics for purposes other than the generation of revenue, our main focus will be on the generation of incremental revenue, in particular, per capita gate receipts which are most readily influenced by the organization. We also briefly treat cost reduction in our empirical analysis, but the professional sports industry—our context for this study—primarily view analytics as a tool to drive revenues.

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We examine the juxtaposition between perception and reality regarding the adoption and assessment of analytics by researching the effects of data capture, data analysis, and strategic planning [27]. To operationalize this concept, we incorporate these components into an index. We allow that the creation of an Analytics Index is the first key contribution of this paper and can be generalizable beyond the setting of professional sports.

The second contribution springs from the context, and is the bridging of two distinct concepts of rationality: economic rationality as measured by the maximization of revenues, and sociological rationality exemplified by the search for legitimacy. Too often these different motivations are treated as adversarial, c.f. the debate over business planning [21,25]. It is likely that both are at work in the decision of professional sports organizations to adopt analytics in their business operations. The mapping of industry characteristics, their theoretical influence on motivations to adopt analytics, and hypothesized outcomes, are a second offering of our work.

The remainder of the paper is organized as follows. First, we outline our research setting. Next, we develop the theoretical framework behind analytics adoption and the elements of analytics, and we propose hypotheses for testing. The methodology section follows the literature review and covers sample selection, survey design, variable construction and validity, and empirical tests employed. The results, including robustness checks and extensions of the methodology, are the penultimate portion of the paper. Discussion of the results, including avenues of future research, concludes the manuscript.

2. Research setting

We examine the use of analytics in the North American professional sport industry. The sport industry is widely regarded as one of the fastest-growing industries in the world [43]. Sports-related television programming is consistently ranked at the top, e.g. the Super Bowl deciding the champion of the National Football League in American football. Sports personalities such as Michael Jordan and LeBron James have become global icons that endorse international firms, and celebrity sports figures are some of the most well-compensated income earners in the world [17].

In North America, professional sports leagues operate as legal monopolies with few direct substitutes ([44,47,16,45] This monopolistic behavior, which gives enormous leverage to both the league and individual franchises, has led to increased bargaining positions in negotiating broadcasting rights, negotiating new stadium construction with municipalities, and franchise location. Additional factors that separate professional sport leagues from other industries include lack of rival competitors, league/franchise structure (teams compete on the field, but collaborate on revenue streams), and capital depreciation of player contracts [64,34,58].

Although previous research is mixed regarding whether or not professional sport organizations are profit maximizing [62,63]; more recent scholarship affirms profit-maximizing behavior among pro sports teams [16]. Rising franchise debt payments, ever-increasing salaries, and new stadium financial obligations compel organizations to continue to either enhance current streams or find new sources of revenue [53].

Another salient feature of professional sports organizations is that they are privately held by individuals and/or families. As such, they are under no obligation to release financial information to the public. Outside of the owner(s) and the parties with whom they choose to share this information, the financial position and performance of the organization is opaque. For this reason, it is quite possible that even relatively senior managers in the organization may perceive that analytics is improving revenue growth when in reality this is not the case.

The role that analytics plays on the business side of sport is relatively neglected, despite a trend among sports organizations implementing analytics to drive revenue. Examples of sports organizations using analytics to increase revenue include: dynamic pricing, customer relationship management, measuring sponsorships and advanced database marketing [36]. This lack of academic research on how sport organizations use analytics to increase revenue may be due to the "internal" nature of sport teams which leads to a lack of data to analyze [6].

3. Literature review and theory development

3.1. Legitimacy and imitation

A normative approach to management suggests that analytics will enhance a firm's financial outcomes [30,46], though empirical support for elements of analytics, such as planning, is mixed [57]. As mentioned, a salient aspect of the professional sports industry is the relative lack of competition. This lack of competition would suggest that, economically speaking, there is little incentive for management to adopt analytics to improve their organization's fiscal performance. It is apparent why certain industries, such as airlines, would seize the opportunity to grow revenues and profits via analytics given their structure, but it is not so obvious in this context.

The answer may be sociological. Other scholars note how organizational techniques, procedures, and processes can exist without providing economic value due to imitation, reputation, and legitimacy [37,12]. Staw and Epstein [52], p. 524 state that "early qualitative and descriptive studies illustrated how organizations structure themselves not so much to execute their tasks more efficiently, but to gain legitimacy or cultural supports" (e.g., [51,60,38,11]). This is not to say that an organization pursuing a strategy for legitimacy reasons will necessarily suffer negative economic consequences [50], only that economic rationality is not the primary motivation. The driver is what DiMaggio and Powell [12] term "institutional isomorphism," the tendency for organizations to homogenize with respect to their structures and practices. Professional sports organizations feel both mimetic and normative pressures to adopt analytics because that is what professional managers in other industries do; it is a mark of professionalism to employ analytics in business operations.

Although the word "rhetoric" often has a pejorative connotation in the vernacular, previous academic research has noted the importance of managerial rhetoric in accomplishing tasks ([61], p. 633). In research regarding Total Quality Management, rhetoric was used to confirm legitimacy on an organization [56]. Zbaracki [61] explains that future research might examine "cycles of increasingly inflated promises of technical merit, coupled with increasingly diffuse definitions, and then followed by a collapse in claims" (p. 633). Since managers in other industries use analytics to drive revenue growth, it is logical that managers, when imitating these organizations in other industries, expect that analytics will enhance their own organizations' revenues. Given this use of rhetoric and the organizational tendency to seek legitimacy via imitation, we anticipate the following:

H1. Managers[4] in professional sports organizations will perceive that the use of analytics in business operations increases revenues.

[4] We use "managers" here in a broad sense here to distinguish those who run the company from passive owners. Managers may hold any title from "manager" to "CEO."