

TALENT MANAGEMENT BASED ON STATISTICS. THE MONEYBALL PERSPECTIVE

Daniel Gajda*, **Michał Bartoszewicz****

Abstract

This paper presents the issue of the usage of statistics in sport clubs players management and its possible transfer to talented employees management. The main aim of the study is to present the genesis and discuss the example of usage of the statistical analysis in management of sport talents, as well as, the implication of this solution from the sport to the ground of organization and management theory, in order to extend the set of existing talent assessment techniques. The most important conclusion from this theoretical study reveals, that assessment based on statistical analysis, widely used in sport, can be adopted into business – for assessment of talented employees, because it is more precise and objective than traditional, more subjective assessment conducted by a manager or HR specialist. Authors make their reflections on the basis of in-depth literature studies. The article has been supplemented by the case study which uses the statistical analysis.

Keywords: *talent management, talent assessment, statistical analysis, sport.*

1. Introduction

The world of sport increasingly opens up to statistical analysis, understanding that it can tip the balance in favour of one or the other club. When the game is played for prestigious trophies and millions of euros, managers, coaches and players are able to do a lot, in order to ensure themselves the advantage over the rivals (Anderson and Sally, 2014, p. 12). Although the usage of statistical analysis in sports was postulated in the 1970's, a significant interest in this issue took place in the last decade. The proof for this could be the growing attendance at the “MIT Sloan Sports Analytics” annual conference organized to discuss the future of sports analytics. The first edition of this event – in 2006, attracted only 60 members, one of the last edition hosted nearly 2.3 thousand participants: researchers, journalists and managers from more than 70 clubs (Grynkiewicz, 2012).

* M.A., Faculty of Human Resource Management, University of Economics in Katowice, ul. 1 Maja 50, 40-287 Katowice, e-mail: daniel.gajda@ue.katowice.pl.

** M.A., Faculty of Human Resource Management, University of Economics in Katowice, ul. 1 Maja 50, 40-287 Katowice, e-mail: michal.bartoszewicz@ue.katowice.pl.

The derivative of the usage of statistical analysis in sports was the change in players assessment method. In order to eliminate the subjectivity in assessment carried out by the coach or people responsible for hunting sports talents, sports clubs started to assess players based on individual statistics. Michael Lewis, in his book *Moneyball: The Art of Winning an Unfair Game*, asks a rhetorical question, whether the problem of unfair assessment refers only to professional athletes? (Lewis, 2011, p. 92). Sport managers, before implementation of players assessment based on statistics, as well as the company managers, make mistakes in assessment of employees, by undervaluing or overvaluing their talents. The question is why not apply statistical analysis, like sport clubs did, to assess the talented employees in a company?

The main aim of the study is to present the genesis and discuss the example of the application of statistical analysis in the management of sport talents, as well as the implication of this solution from the sport to the ground of organization and management theory, in order to extend the set of existing talent assessment techniques.

2. The genesis of statistical analysis in sport

The pioneer of the usage of statistical analysis in players assessment was the American baseball club Oakland Athletics (A's) (Grynkiewicz, 2012). In the 1990's, the CEO of the club – Billy Beane – rejected the existing principles of building the sport team that had been improved over a hundred years of the history of baseball, because Oakland A's, having a much lower budget at their disposal compared to that of their competitors, were doomed to failure. The best players of Oakland were going away to generous clubs, moreover A's had no money to employ valuable successors³ (Stec, 2011). In addition, the process of recruitment of new players amongst amateurs was ineffective. Beane had said: “The draft⁴ has never been anything but a fucking crapshoot. We take fifty guys and we celebrate if two of them make it. In what other business is two for fifty a success?” (Lewis, 2011, p. 30).

Billy Beane, with his assistant – Paul DePodesta, inspired by publications of Billy James and Eric Walker that discussed the usage of statistics in baseball, implemented the unconventional concept of assessment and selection of the players basing on statistical analysis (Lewis, 2001, p. 80-81). They

3 In 2001 Oakland A's lost three top players to wealthier clubs: Jason Giambi, John Damon and Jason Isringhausen. Giambi went to the New York Yankees club that offered him a 7-year contract worth \$ 120 million. Damon went to the Boston Red Sox, signing a four year contract worth \$ 32 million, while Isringhausen signed a contract with St. Louis Cardinals worth \$ 28 million (Lewis, 2011, p. 36).

4 Draft – practiced mostly in the United States is the method of selecting new players to the professional leagues, mostly among the young players just starting a professional career. Players reported to recruitment are being picked by clubs, in each round each club can pick only one player.

recommended hiring players with conspicuous flaws, rejected by other clubs⁵, which, however, as statistics had shown, displayed a single trait desirable in a baseball player. Those player with the remarkably developed quality, were then positioned in such a way, that the players complemented each other. The main aim of Bean and De Podesta was to minimize the impact of individual players' weaknesses on the game, yet maximize their extraordinary attributes and to bring the game to a higher level of teamwork (Stec, 2011). The starting point for achieving this aim has become a statistical analysis of individual players. According to the adopted approach, scoring the points resembled the production process rather than a symptom of talent. If each player performed his tasks at the production line and the production became a routine, the points could be produced in mass (Lewis, 2011, p. 76).

Earlier, the selection of players was based on observation and intuition of scouts – people responsible for hunting talents. Such method of assessing players was encumbered with high subjectivity and inaccuracy. During the baseball game a lot of things are hard to see because human senses tend to be unreliable. In addition, the scouts, mainly ex-players, had a tendency to generalize conclusions basing on their own experiences. An important mistake was also the fact of applying exaggerated attention to the player's last performance, because it does not guarantee similarly satisfactory performance in subsequent games (especially with a new team). The new way of looking at the players uncovers the illusions created by people "steeped" in baseball (Lewis, 2011, p. 31).

Statistics allow to break down the scouts' prejudices. For Billy and Paul the young players were not what they looked like or what they could become, but players who could do certain things. This simple and logical assumption was considered heresy among other scouts who did not see anything interesting in the history of the achievements of a player (Lewis, 2011, p. 53). They paid more attention to the athletic and mental attributes of the players. Scouts and coaches' attachment to the action was the biggest problem in implementing the new approach to assessing players, and a source of internal conflict in the Oakland club (Stec, 2011).

Finally Beane, thanks to his position and persistence in achieving goals, stood his ground, and Oakland A's won 20 games in a row, which is still an unbeaten record for the Major League Baseball. This victories convinced the scouts that the new approach was legitimate. Unfortunately, with the current constraints of the Oakland club, Beane was unable to reach the championship, but was able to achieve excellent results with several times lower in comparison

⁵ Reasons for rejecting the players were many: age (players either too young or too old), too short or too tall, too high or too low body weight, low running speed, poor psychological test results, short fuse and bad temper, poor grades in school, unwillingness to learn in college, tendency to abuse the law, or even excessive affection for a girlfriend or the father's conviction for pornography (Lewis, 2011, p. 38-41, 141).

with other clubs, budget. Shortly thereafter, the methods used in Oakland Athletics were implemented in one of the richest baseball clubs – the Boston Red Sox, which resulted in achieving their first championship title after 86 years (Stec, 2011). Describing the story of unequal struggle of Oakland A's with more affluent clubs, Michael Lewis describes it as Moneyball – game of a certain concept against the money (Lewis, 2011).

Successes of Oakland and Boston Red Sox helped to popularize the so far niche science – Sabermetrics⁶ – sophisticated statistical analysis aiming to find objective knowledge about baseball (Lewis, 2011, p. 102). While the term “sabermetrics” appeared in the scientific literature as early as in the ‘70s of the last century, a significant increase of interest in this field of science has been observed only in the last decade, as testified by the turnout at the aforementioned conference the “MIT Sloan Sports Analytics” (Grynkiewicz, 2012).

Baseball started the statistical revolution in all sports, especially in football. As can be observed, for several years now football clubs have been evolving into global corporations with annual budgets of hundreds of millions of euros. Competing at both the sporting and financial level, they want to acquire the knowledge that will give them an advantage over other clubs. Given the fact that footballers playing in one of European's leading leagues earn 1-3 million euros per season⁷, it is worth of involving legions of analysts who reduce the risk of choosing and contracting the wrong player. Scouts from European football clubs started to travel across the ocean in order to develop their knowledge of analytics and learn from America's best sabermetrics practitioners (Stec, 2011).

Nowadays, analysts employed at football clubs gather thousands of statistical data on the behavior of individual players during matches and training, using special video equipment, and then analyze collected data using dedicated software. The growing demand for this type of data and analysis can be proven by the emergence of specialized companies, such as: Amisco, Match Analysis, Opta, Prozone or StatDNA, which, commissioned by sports clubs, do all off the analytical work so that the club manager receives a substantial report, based on which he can make personnel decisions. Apart from data on players, clubs also collect medical data and data on sales – e.g. on the quantity and value of sold tickets, soccer gadgets (shirts, scarves, etc.) or snacks and beverages sold at the stadium (Anderson and Sally, 2014, p. 13). To provide better understanding of the meaning of the use of statistical analysis in assessing players, the next part of this article presents a case study.

⁶ The name derives from the acronym SABR, meaning the Society for American Baseball Research (Lewis, 2011, p. 102).

⁷ The average annual player's salary in Europe's top leagues is as follows [amounts in euros as of 14/11/2014]: England – 2 859 308; Germany – 1 832 055; Italy – 1 652 337; Spain – 1 525 731; France 1 242 614. The best players get tens of millions of euros per year (Sośnicki, 2014).

3. The example of the use of the statistical analysis in assessing players – Manchester United Case Study

The most successful English football club – Manchester United, won the last championship in 2013 (Robinson, 2014a). In the same year, after 26 years of work, head coach of United, Sir Alex Ferguson announced his retirement. That was a big loss for the club, because during his 26 years at the club, Ferguson won 38 different trophies (Blitz, 2013). This was the beginning of the problems for the club. The new United manager – David Moyes, after 8 months of work, was fired because players that won the championship the year before, took 7th place in the English league (Kuper, 2014). In 2014 Manchester United recruited a new manager – experienced and charismatic Dutch coach Louis van Gall (Robinson, 2014b). In his first season he led Manchester to 4th place in the league. Statistics showed that there was progress in the game (Gill, 2015). Although, in order to compete for the championship the following season, the team needed strengthening the squad. The new coach had two answer two questions: what skills are crucial, and who has these skills?

Scored goals are the essence of football because the team that scores more goals wins the match. Goals secure victories, victories score points, and points ensure the place in the league table (Anderson and Sally, 2014, p. 104). Chris Anderson and David Sally, in their book “The Number game. Why Everything You Know About Football is Wrong”, using data from 2000 to 2011 concerning the 4 best leagues in Europe have calculated how many points a team scores, depending on the number of goals they get. The relation between these variables is shown in Figure 1.

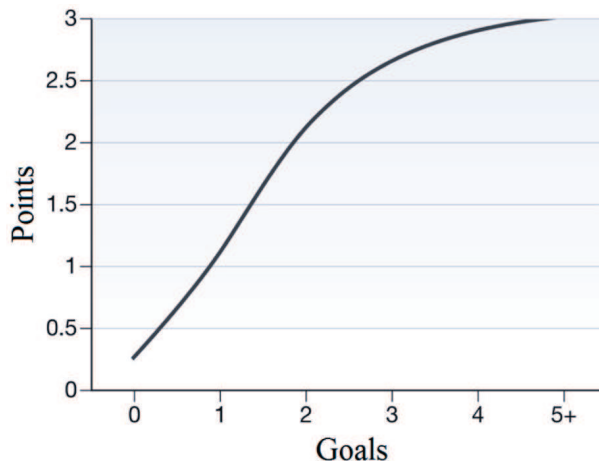


Figure 1. Goals and points per game in four strongest European leagues, years 2000-2011

Source: Anderson and Sally (2014, p. 105).

As shown above, the more goals scored, the greater the chance of winning the match. According to the analysis shooting 5 or more goals almost guarantees three points. It should not be surprising, that if the team does not score any goal, it will not get too many points, but at the same time it does not mean that lack of goals does not provide us any points. In 8% of the matches there were scoreless draws, which gave both teams one point. From the statistical point of view, one goal guarantees one point, two goals bring the team closer to the win, but scoring even three or four goals does not guarantee a three points.

Looking at the final table of the English league matches of the season 2014/2015 (Figure 2) it is easy to see the difference between the number of goals scored by Manchester United and the number of goals scored by the team that won the championship – Chelsea.

Pos	Team	P	W	D	L	GF	GA	GD	Pts
1	Chelsea (C)	38	26	9	3	73	32	41	87
2	Man City	38	24	7	7	83	38	45	79
3	Arsenal	38	22	9	7	71	36	35	75
4	Man Utd	38	20	10	8	62	37	25	70

Legend:

Pos. – Position in English league table

W – number of wins

D – number of draws

L – number of losses

P – number of played games

GF – Goals for

GA – Goals against

GD – Goal difference

Pts – number of points

Figure 2. Fragment of the final table of the English soccer league, season 2014/2015

Source: <http://eurosport.onet.pl/pilka-nozna/liga-angielska/tabela/?tid=p74p0>.

In the season 2014/2015 United scored 62 goals, while Chelsea scored 73. The data shows simple conclusion that Manchester scored too few goals to win the Championship. The difference in the number of goals scored by both teams has definitely impacted the final standings in the league. We took a closer look at the statistics of strikers – players who are most responsible for scoring goals.

Individual statistics of Manchester United and Chelsea strikers are summarized in Table 1.

Table 1. Individual statistics of Manchester United and Chelsea strikers in season 2014-2015*

Manchester United FC				
Surname	Name	Number of appearances	Number of goals	Goals per game
Rooney	Wayne	33	12	0,36
van Persie	Robin	27	10	0,37
Falcao	Radamel	26	4	0,15
Wilson	James	13	1	0,08
Total		99	27	0,96
Chelsea London FC				
Surname	Name	Number of appearances	Number of goals	Goals per game
Costa	Diego	26	20	0,77
Remy	Loic	19	7	0,37
Drogba	Didier	28	4	0,14
Total		73	31	1,28

*The list includes players who played for their clubs at least 10 matches in season 2014/2015 in English league. Source: own study based on data from the website <http://www.goal.com/en/>

As shown in Table 1, four of Manchester's forwards scored 27 goals, while three Chelsea's strikers scored 31 goals. Although the number of goals scored by forwards of both clubs is similar, a lower number of Chelsea forwards scored more goals than United forwards. The Manchester United did not have any forwards who could score approximately 20 goals per season. Moreover, Chelsea forwards, thanks to Diego Costa, had a higher average of goals per game. In order to answer the question who could fill this gap, the statistical analysis based on individual performance of strikers in season 2014/2015 has been conducted. The search criteria were as follows:

- position: striker,
- age: in order to match the club policy – under 30 years of age,
- former employer: club from outside of the forefront, i.e. not present in the Champions League in season 2014/2015, player playing for the top club, may not express desire to leave,
- experience: at least 20 games last season in the top European league: English, German, Spanish, Italian or French.

Based on the statistical analysis a short list of names of players who could be recommended for Manchester has been created (Tables 2 and 3).

Table 2. List of recommended players according to the criterion of the number of scored goals

Surname	Name	Age	Club	Number of appear.	Number of goals	Goals per game	Market value (€m)
Lacazette	Alexandre	24	Olympique Lyon	33	27	0,82	30,00
Icardi	Mauro	22	Inter Milan	36	22	0,61	32,00
Kane	Harry	21	Tottenham Hotspur	34	21	0,62	50,00
Gignac	André-Pierre	29	Olympique Marseille	38	21	0,55	10,00
Bacca	Carlos	28	Sevilla FC	37	20	0,54	25,00
Austin	Charlie	25	Queens Park Rangers	35	18	0,51	9,00
Higuain	Gonzalo	27	SSC Napoli	37	18	0,49	43,00
Gradel	Max	27	AS Saint-Étienne	31	17	0,55	6,50

Source: own study based on data from the website <http://www.transfermarkt.de/>.

Table 3. List of recommended players according to the criterion of the average number of goals per game

Surname	Name	Age	Club	Number of appear.	Number of goals	Goals per game	Market value (€m)
Lacazette	Alexandre	24	Olympique Lyon	33	27	0,82	30,00
Dost	Bas	26	VFL Wolfsburg	21	16	0,76	6,50
Kane	Harry	21	Tottenham Hotspur	34	21	0,62	50,00
Icardi	Mauro	22	Inter Milan	36	22	0,61	32,00
Gignac	André-Pierre	29	Olympique Marseille	38	21	0,55	10,00
Gradel	Max	27	AS Saint-Étienne	31	17	0,55	6,50
Bacca	Carlos	28	Sevilla FC	37	20	0,54	25,00
Austin	Charlie	25	Queens Park Rangers	35	18	0,51	9,00

Source: own study based on data from the website <http://www.transfermarkt.de/>.

The Tables were created by authors based on statistical data referring to three hundred forwards. Players were classified according to two criteria: the number of scored goals and the ratio of scored goals to the number of appearances. Considering both criteria, the most effective player is the Frenchman, Alexandre Lacazette, who plays for Olympique Lyon. Specialized portal *transfermarkt.de* put this player's value as thirty 30 million euros. Since the value of the player is high, the best relation of value to effectiveness would be achieved by Manchester if they could attract such players as Charlie Austin from Queens Park Rangers or Bas Dost from Wolfsburg.

The case study presented here demonstrates very basic possibilities of the use of statistical data in the evaluation of players. Only limited data set

was taken into consideration out of a significantly larger set on each player playing in the major league. The following section of the article is an attempt to show implications of the idea for business.

4. Implications for business

Considerations carried out within this article do not relate exclusively to sport. From the presented case study we can draw several implications for business. Assessment based on statistical analysis can be successfully used not only in sport but also in other areas. Such approach is presented by statistician Nate Silver. In 2008, using the system to predict the course of the careers of players, he predicted the winners of the elections to the electoral college in 49 out of the 50 states, as well as the results of the competition for all 35 seats in the US Senate (Gryniewicz, 2012). At this point a question arises whether the described solution can be applied in business?

If a professional baseball player can be underestimated or overestimated, the same may be done about the employees. If several thousands of audience in the stadium and a several million audience in front of the TV can make a mistake in the evaluation of the player, what can we say about evaluation of an employee by a single supervisor? Similarly as managers of baseball clubs before sabermetric revolution, many company managers and HR professionals make mistakes in assessing their employees (Bovis, Pressman, Gagne & Sisco, 2012).

Unfair evaluation may result in the loss of trust, poor motivation and commitment to work, further more it can raise the level of stress and emotional tension, cause conflicts among the employees or employees and superiors, which undermines the atmosphere in the organization. In addition, it may create a feeling of undervaluation, aversion to developing qualifications, insecurity of employment, and, as a result, cause spontaneous departure of talented employees from the company (Tadrała, 2001; Królik, 2006). Errors in assessment made during the recruitment and selection process, may lead to the exclusion of some talented candidates. When the knowledge, skills, attributes and motivation of employees are not synchronized with the requirements of the job, it will be a loss for an employee, his team and the entire organization (Bovis et al., 2012).

Even if the statistical analysis used to assess the players is not the most accurate, it may still be more accurate than subjective assessment of the manager. Why, therefore, companies do not assess their employees based on their performance statistics, in the spirit of the idea of Moneyball? It is worth re-verifying solutions currently used in organization problem solving policy, including those related to employee evaluation. Changing global demographic

trends make it harder to find high-performing employees suitable for the changing job requirements. Statistical analysis may be harder to conduct in business than sport because of the vast variety of skills, activities, metrics and even definitions of success. But harder does not mean impossible. In past decades, data for performance evaluation was minimal. Nowadays, companies can use sophisticated employee-assessment tools to gather and convert data and find better metrics for assessing employees' efficiency.

Many arguments speak in favor of the usage of statistical analysis for the assessment of employees' efficiency. Evaluation based on the statistics is more objective, compared with the evaluation based on observation only. Statistics allow us to see things, which could not be normally noticed, which is extremely important especially in the process of assessment and selection, if we do not want to lose talented employees. The usage of statistical analysis in the assessment of employees' may increase the return on investment in employee (Bovis et al., 2012).

5. Implications for business – example

To provide better understanding of presented idea of transfer of statistical analysis from sport to talented employee assessment, authors decided to present a theoretical example applied in business. For the need of the example we assume there is an IT company focused on providing specialized software for all sort of industries. Lately, the company engineers have created a completely new product, which is going to create a new niche on the market, because no other IT company is providing such software solutions to its clients. The board of the directors have decided that it is crucial for the company to gain a big market share before other software providers develop such system, as on the IT market there is a tendency to copy products. During the strategy meeting it was agreed that there is a need to create a very efficient sales team that will be able to reach high sales goals to gain a substantial market share.

The sales Director, Product Manager and HR Manager were asked to work together on this case. In typical approach, the company would either search for best sales representative internally, externally or both. In the presented case we are concentrating on the fact that time is crucial, the team must be reliable and, at the same time, by creating the team we do not want to affect the current sales strategy by e.g. withdrawing best sales representatives from other teams, thus risking conflicts with team managers etc. The Sales Director together with the Product and HR Managers, decided to use statistical analysis for this case. They started with creating the list of most important, crucial characteristics of a successful sales representative in IT business. They are presented below:

- 1) Effectiveness in arranging meetings over the phone.
- 2) High efficiency in concluding agreements.
- 3) Ability to retain customers – satisfactory post-sales sale service together with the ability to receive recommendations.
- 4) Ability to upsell⁸

The main difference between traditional approach and the proposed one is that the team, instead of concentrating on finding best sales representatives based on their general results and opinions “who is the best”, decided to use data that company gathers about its sales forces, and then statistically analyze it to find extraordinary performers. The team looked at the data that company is gathering on sales representative that relates to earlier defined crucial features/abilities. Their findings were:

- 1) Effectiveness in arranging meetings over the phone – company for many years has been setting goals and gathering data on numbers and effectiveness of the so called “cold calling”⁹. Statistics: average number of performed calls per week; effectiveness of the calls (how many out of all led to meetings).
- 2) High efficiency in concluding agreements – company possess detailed data on every signed agreement by each of the employees. Statistics: number of signed agreements per quarter; value of signed agreements – amounts.
- 3) Ability to retain customers – company possess detailed history on customer retention, which salesperson has lost how many contracts etc. Statistics: average length for the customer loyalty measured in relation to salesperson that was responsible to provide after sale services; number of contracts lost per salesperson; number of recommendations that a salesperson received from the customers.
- 4) Ability to upselle – company possess detailed history of all of the systems that were sold to each customer. Statistics: how many times a sales representative sold new software to the current customer; how many times a salesperson sold an upgrade of the system; what was the amount.

Having these criteria at their disposal, the team consisting of Sales Director, Product Manager and HR Manager were able to choose the best employees of the sales force in the relation to the metrics. The problem was, that they did not want to corrupt the life of sales team by taking the so called best salesperson from the team. At the same time they all agreed that it would be acceptable to divide the sales process into stages with individual sales

⁸ Upselling refers to a sales process, to upsell means to sell more expensive products, upgrades or to sell new products or services to existing customer of current product, service.

⁹ Cold calling refers to the sales process, defined as the solicitation of business from potential customers who have had no prior contact with the salesperson conducting the call, therefore making the call cold. Cold calling is used to attempt to convince potential customers to purchase either the salesperson’s product or service or to agree to meet with the salesperson to see the product.

representatives responsible for each stage: cold calling, giving presentations, signing the contract, and the post-sale service. They decided to run statistical analysis against the given criteria on company available data to find exceptional performers in each category. What is interesting, they decided that in case of the concluded agreements criterion, they were going to search for the most effective salesperson, meaning someone that had signed the biggest number of contracts in number and amounts in relation to the number of meetings he had conducted. The process of cold calling would be conducted by someone who was not the best salesperson but his ability to arrange meetings over the phone was exceptional. The process of post-sale service would be transferred to a person with best statistics in terms of retaining customers and upselling.

The approach presented here suggests there is another way of creating a successful sales team, where all of the team members are possibly average sale representatives, but put together, all are exceptional in their specialization and may be complementary for each other, creating a very successful sales force. What is interesting, the whole process may be conducted without corrupting current sales strategy by taking out best sales people from the teams. Thanks to statistical analysis run on the data collected, the company can put together employees with exceptional skills which are complementary and necessary for the success of the project.

The above example needs to be tested in real life situation, but there are arguments that speak in favor of it. Mainly, because such approach may guarantee high effectiveness on each of the steps of building sales results, as well as it can highly motivate the employees as they would be in charge of the stages of the process in which they feel strong. Obviously, these theoretical assumptions have some limitations and threats e.g. how to adjust the sales provision system, etc., but it is worth examining with greater care.

6. Conclusion

Statistical analysis is much more than numbers. It is open to all sorts of data and information – official and unofficial, ordered and unordered, recorded, collected and stored, to find any regularities, patterns and relationships that they can hide. Baseball, football or other sports decided to use it for people assessment. Business, where managerial intuition plays an important role, remains distrustful to it.

The proposed approach does not constitute a revolution in the field of talent management. Today's businesses have access to a wide range of advanced tools for data collection and data conversion in the area of human resources. The question is how many managers and specialists use these data in the employee assessment.

The authors do not claim that the existing methods of employee assessment are incorrect and should be rejected. Very often, data analysis can confirm the truth of what was seen and what was believed. Employee assessment based on statistical analysis can, however, reveal the facts that are hard to see intuitively only, and which may change existing beliefs.

The authors present a theoretical example of the use of statistical analysis in assessing employees to create a successful sales team. Despite its limitation, it may be an interesting object of further studies.

References

- Anderson, Ch., Sally, D. (2014). *Futbol i statystyki. Dlaczego wszystko, co wiesz o piłce nożnej, jest nieprawdą*. Wrocław: Bukowy Las.
- Blitz, R. (2013). United's global brand reaches crossroads. *Financial Times*, 9 May 2013, 3.
- Bovis, B., Pressman, A., Gagne, D., Sisco, B. (2012). Quantitative Talent Management: A Moneyball Perspective. *Human Resource Executive Online*. Retrieved from <http://www.hreonline.com/HRE/view/story.jhtml?id=533348084>.
- Gill, K. (2015). The numbers game: Louis van Gaal vs David Moyes... both had 37 points after 21 games but only one spent £153m... so, have Manchester United made ANY progress? *Dailymail*, Retrieved from: <http://www.dailymail.co.uk/sport/football/article-2906578/Louis-van-Gaal-vs-David-Moyes-Manchester-United-progress.html>.
- Gryniewicz, T. (2012). Algorytmy w służbie sportu. *Gazeta Wyborcza*, Retrieved from: http://wyborcza.biz/biznes/1,101562,12331624,Algorytmy_w_sluzbie_sportu.html
- Królik, G., (2006). Ocenianie pracowników. In: H. Bieniok (Ed.), *System zarządzania zasobami ludzkimi przedsiębiorstwa*. Katowice: Wydawnictwo Akademii Ekonomicznej im. Karola Adamieckiego w Katowicach.
- Kuper, S. (2014). Moyes caught offside by his inability to master Manchester Utd PR game. *Financial Times*, 23 April 2014, 1-2.
- Lewis, M. (2011). *Moneyball. Nieczysta gra*. Katowice: Wydawnictwo Sonia Draga.
- Robinson, J. (2014a). David Moyes Out as Manchester United Manager. Scotsman's Departure Comes After Less Than Year in Charge at Premier League Soccer Club, *Wall Street Journal*, 22 April 2014.
- Robinson, J. (2014b). Louis van Gaal Named Manchester United Manager; Ryan Giggs Named Assistant Manager After Calling Time on Playing Career. *Wall Street Journal*, 19 May 2014.
- Soñnicki, J. (2014). Średnie zarobki piłkarzy według lig. *Przegląd sportowy*. Retrieved from: <http://www.przegladsportowy.pl/pilka-nozna/ligi->

zagraniczne,srednie-zarobki-pilkarzywe dlug-lig-najwiecej-placi-sie-w-premier-leagueekstraklasana26miejscu,artykul,518356,1,4 23.html.
Stec, R. (2011). Mit, w którym zagrał Pitt. *Gazeta Wyborcza*. Retrieved from:
http://wyborcza.pl/duzyformat/1,127291,10779475,Mit__w_ktorym_zagrał_Pitt.html
Tadrała, D. (2011). Warunek udanych ocen. *Personel i Zarządzanie*, 9, 36-37.

Internet sources

<http://eurosport.onet.pl/pilka-nozna/liga-angielska/tabela/?tid=p74p0>
<http://www.goal.com/en/>
<http://www.transfermarkt.de/>