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ABSTRACT

The processes of an investment bank are considered to be particularly knowledge-intensive, because analysts need to extract or generate relevant knowledge from a variety of data. With increasing digitization, modern data science and business intelligence techniques are available to support or partially automate these activities. This study presents concrete use cases for front office processes of an investment bank as how knowledge management techniques can be used. For example, the article describes how expert systems can be used in the due diligence review or how fuzzy logic systems help in deciding whether to buy or sell securities. The article is based on 1079 texts (e.g. documented cases and articles) and serves researchers as well as practitioners as an application overview of data science techniques in the example area of knowledge-intensive banking processes.

KEYWORDS
Business Intelligence, Business Process Management, Data Science, Investment Banking, Knowledge Management

INTRODUCTION

“A firm’s competitive advantage depends more than anything on its knowledge: on what it knows – how it uses what it knows – and how fast it can know something new” (HRM, 2009).

In today’s globalized world, companies are no longer competing solely on the basis of the classic production factors such as capital, land and labour. Competitive advantages of an organization are increasingly relying on data, or further processed to knowledge (Woodside & Quaddus, 2015). So, the modern work is undergoing a shift from industrial economy that is primarily focused on commercial products, towards a knowledge economy in which competition power result from knowledge-intensive services and processes.

The ongoing digitization of processes has the consequence that more and more data in IT systems are available for decision-making. Therefore, data science as an increasing interdisciplinary field of extracting knowledge from data is becoming widespread in many industries (Grover & Kar, 2017). Especially in those branches, which rely on data and knowledge and especially in those companies, which already use digital workflows for process instances, the application of data science techniques leads to process excellence (Fosso Wamba & Mishra, 2017).

Investment banking, as part of the finance industry, is considered to be one of such knowledge-intensive industries (Schamp & Rentmeister, 2004), although due to tradition and growth, data-driven innovations from other industries (such as Google, Apple, Uber, etc.) are nowadays more heavily

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discussed in the news and journal articles. However, the banking industry is characterized by the increasing share of intangible service components and the growing level of customer interaction within the service creation process (Probst, Raub & Romhardt, 1999). A detailed examination of applied data science in processes of an investment bank seems to be promising - especially considering that there is currently no comprehensive analysis of data science applications published from this area. This article therefore addresses the following practical research question: Which application for data science techniques exist in the processes of an investment bank in order to generate knowledge from data?

FOUNDATIONS

Well-founded methods, processes and algorithms as well as supporting systems are already being used in many companies to generate knowledge from data. Various concrete techniques such as neural networks and expert systems are discussed in science and practice (Gallant, 1993). In general, such techniques aim to support a company’s strategy, structures, and processes so that lessons learned can be used to improve routine tasks (incremental innovation) or even to overcome with completely new business models (radical or disruptive innovations) (Vyas, 2016). By using data with digital techniques, knowledge can be codified and shared between employees, teams and even virtual agents. In a nutshell, with digital data science techniques, organizations can create new value and innovation through knowledge (Berman, 2018). The particular relevance of the topic of data science is reflected by the fact that it is not the pure acquisition of information that is at the center of attraction - due to globalization and the associated rapid growth of digital networks, smart business decisions are characterized by enormous volume, speed and heterogeneity of data (sometimes discussed under the term “big data”). The main task for many companies improving their processes data-driven is to use internal as well as external knowledge to make better decisions in order to increase a company’s learning, adaptability and innovation capacity (Stairs & Reynolds, 2017).

Knowledge in the form of assessments, expertise, ratings and recommendations is the primary resource for successful investment banks. This is due to an enormous variety of internal as well as external data, which need to be processed in order to come to intelligent business decisions (Soderborg, 2017). At the same time, the overall branch is under high pressure through new digital business models (e.g. banking apps, blockchain technology, to name some tends). The intelligent application of data science techniques is currently discussed as primary way to organize the knowledge resource best to strategically distinguish itself from the competition (Tapscott & Tapscott, 2016). For example, for considering the actual value of companies, many structured information such as sales, and number of employees, locations, and products should be considered. At the same time semi- or even un-structured information such as social media reviews, buying recommendations, or test portals results could be used. Going one step further, weak signals such as reviews on employer portals or even hard facts like production efficiency in a smart factory are now available for information processing (Viney & Phillips 2015; Fahami et al. 2015; Witkowska, 1999). What stands out: There are innovative ideas for data usage available that bring new use cases with it. Furthermore, rigid systems and simple database queries need to be rethought in favor of flexible data science knowledge management techniques that make sense of linking internal and external data for good knowledge.

The aim of this contribution is to demonstrate the possibilities of using data science, especially digital knowledge management techniques, in the highly knowledge-intensive sector of investment banking. An investment bank is understood as financial institution whose financial services are directed as a commercial bank to institutional investors such as large corporations, governments, insurance companies and pension or investment funds. On the one hand investment banks are to be distinguished from pure brokers (brokers), which receive a commission for the support of purchase and sale of shares, bonds and public funds (Stowell, 2017). On the other hand, broker-dealers (both brokers and traders) can be differentiated, which operate in a similar way, but act under their own name. In addition to the services of a broker-dealer, investment banks offer their clients support in
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