


# Ontology-Based Analysis of Website Structure for Benchmarking in Retail Business

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## ABSTRACT

With the growing trend of digital transformation, electronic business has become a crucial part of business operations for many companies. Some of the most critical steps in successful transformation pertain not only to data and information acquisition and digitalization but also to adequate publishing and organization of these information resources. Companies share information through their websites, so the structuring of the web content becomes critical during the digital transformation of business. In this paper, the authors present a conceptual model of the managerial tool that is based on semantic analysis of web sites in order to obtain information about the structure of web sites in a particular domain. The resulting ontological model contains information about best practices in web information organization and can be a valuable resource for management when deciding on the organization of their own web content. The system is based on grounded theory and uses current information retrieval methods, natural language processing, semantic networks, and ontologies.

## KEYWORDS

Automatic Information Retrieval, Lexical Databases, Natural Language Processing, Ontologies, Retail Banking, Semantic Annotations, Web Mining

## INTRODUCTION

Digital transformation is an ongoing process of recognizing and embracing digital technologies and digital resources in order to initiate, preferably, disruptive innovation and creativity rendering traditional organization structures, processes, and even entire business models obsolete. Key success factor in applying this concept is the level of digital maturity of a company (von Leipzig et al, 2017). A fundamental prerequisite for digital transformation is extensive use of digital technologies which presumes digitalization of all the data and information resources. In order to better understand the potential of digital resources companies have invested substantial resources in business intelligence in order to provide management with high-quality information for managerial decision making. The

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main purpose of Business intelligence is to apply various data analysis approaches and methods in order to uncover valuable information from the available data resources generated both in the organization and in its environment. Innovative approaches in discovering new information have been used over the past few decades, but still, new approaches are implemented in order to retain a comparative advantage over competitors. One such approach is benchmarking that allows companies to determine their own position or maturity level in comparison to competition or current best practices in various problem domains.

Benchmarking is the practice of estimating the current position of a company by comparing their performance metrics and data to established industry standards, best practices in industry or metrics of their competitors. It may incite improvement of the efficiency of business processes, reengineering of organizational structures and responsiveness to changes in the business environment. It also incurs additional effort and drains on company resources. Establishing a system that reduces the cost of using benchmarking such as automating the development of benchmarking models is called for.

Potential of semantic networks and ontologies has been recognized for some time (Drew, 1997) and still these methodologies have not been extensively implemented as a part of business intelligence systems and tools. The goal of this paper is to present the approach to analyze web site structure in order to create a structural semantic model for the particular type of web sites that can capture current best practice in the organization of web information. Different organizations organize their information in different ways and discovering the most prevalent approach may indicate best practice in the presentation of information. The inferred model is ontology created through the inductive process and can serve as a benchmarking tool which is the main contribution of the work presented in this paper.

The rest of this paper is organized as follows. Section II describes the role of benchmarking in analyzing current business performance as part of managerial decision-making as well as the background on implementations of various methods that support his analysis, including web and text mining, ontologies and semantics. Section III describes the details of the conceptual model for induction based ontological model that includes automated information retrieval, analysis, contextualization. It also describes phases in developing a benchmarking model that is based on the described semantic content analysis that can be used as a powerful managerial tool for decision-making. Section IV addresses the case of implementing the described system as proof of concept. It is based on revealing best practices in structuring banking web sites and describes the developed semantic model. Section V presents the discussion of presented work, points out the main conclusions and presents further steps in the development of applications for the described model in various practical areas of economics and business.

## **BACKGROUND**

The importance of benchmarking in business intelligence as a decision support method is crucial in a contemporary business organization. In this section, we will make an overview of the most recent developments regarding benchmarking analysis in current literature. Here we will also as provide background on semantic networks and ontologies as a valuable asset for enriching business intelligence methodologies and tools.

### **Benchmarking in Analyzing Business Performance**

Benchmarking is the process of analyzing business processes by comparing their performance and other properties with current best practice or industry standards for particular business domain. Companies have been applying this approach as an important part of decision support to make their processes more efficient (Martins & Zacarias, 2017; Teuteberg et al., 2013). Various quantitative and qualitative methods have been used to analyze available information about current best practices, such as knowledge management, knowledge-based systems (Ouali et al, 2016), simulation modelling, data mining (Cho et al, 2017), mathematical modeling (Cook et al., 2004), etc. The main disadvantage

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