



Conceptual Modeling for Corporate Social Responsibility: A Systematic Literature Review

Otilia de Sousa Santos¹, Patrício de Alencar Silva^{1(✉)},
Faiza Allah Bukhsh², and Paulo Gabriel Gadelha Queiroz¹

¹ Programa de Pós-Graduação em Ciência da Computação, Universidade Federal Rural do Semi-Árido (UFERSA), Mossoró, Rio Grande do Norte, Brazil
otilia.santos@alunos.ufersa.edu.br,

{patricio.alencar, pgabriel}@ufersa.edu.br

² Department of Computer Science, University of Twente, 7500AE Enschede, The Netherlands
f.a.bukhsh@utwente.nl

Abstract. Enterprises have been challenged to adopt practices of sustainability to benefit shareholders and society with goods standing much beyond monetary profit or required by law. In combination with environmental and economic concerns, Corporate Social Responsibility (CSR) has become an option to leverage businesses with good reputation and to attract sustainability-aware market segments. In line with such a demand, this paper presents a systematic literature review of conceptual modeling studies referring explicitly to certifications, laws or norms of CSR. The more specific research goal of this work is to discover ontologies for representing CSR best practices, design patterns or policies. In total, 921 peer-reviewed papers were analyzed, from which only 17 were considered relevant for data extraction. The main result of this work is the identification of a research gap in explicit knowledge representation of CSR practices for Information Systems design, which ought to be filled to complement the (dominant) economic perspective on sustainability.

Keywords: Conceptual modeling · Corporate Social Responsibility · Sustainability · Ontology

1 Introduction

Normally, corporate strategies include sustainable practices to minimize risks related to the reputation of businesses, market instability or compliance to regulations [1]. According to Carrol (1979), “for a definition of social responsibility to fully address the entire range of obligations business has to society, it must embody the economic, legal, ethical, and discretionary categories of business performance” [2]. Corporate Social Responsibility (CSR) creates perspectives on doing businesses that are both profitable and socially rewarding. This definition is extended by Cai et al. (2011), who elaborate on a variation of CSR named Logistics Social Responsibility (LSRS), which is particularly important in Value Chain Management for returning value to society

from the extraction of primary resources to the delivery of final products and services to the final consumers [3].

CSR practices can be used by enterprises to leverage reputation in sustainability-aware markets, ultimately leading to profit increase. This paper reports on a systematic literature review on conceptual modeling explicitly referring to certifications, frameworks, guidelines, laws, norms and ontologies for describing CSR practices or business policies. Among all the conceptual modeling approaches, ontologies are of special interest in this research for enabling group communication and establishing the basis for linguistic contracts. Hence, this report is aimed to synthesize the quest for conceptual modeling approaches in general to somehow describe CSR business practices. In Sect. 2, we describe the protocol grounding this systematic review. We describe the review process in detail in Sect. 3. In Sect. 4, present and discuss the review findings and results. Some limitations and conclusions are summarized in Sect. 5.

2 Systematic Review Protocol

The systematic review protocol used in this research combines major guidelines proposed by Biolchini et al. [4] and some minor recommendations defined by Kitchenham et al. [5]. The protocol prescribes *research goal*, *scope*, *research questions*, *search strategy*, *study selection criteria* and *search terms*, as described as follows.

2.1 Research Goal and Scope

The motivation of this work is an ongoing research project about enriching Value Network Modeling with CSR concepts. Our research goal is to discover and classify contributions on conceptual modeling approaches for CSR. Such contributions might include case studies, certifications, frameworks, laws, modeling patterns, or, in the best case, ontologies for representing CSR business policies or practices. The classification of these approaches will provide an overview of how CSR has been treated by the conceptual modelling community, its development trends, and research gaps. This research goal is twofold: (1) *to identify norms, laws, regulations or standards for categorization of CSR practices or policies*; and (2) *to discovery conceptual modeling approaches, i.e. frameworks, modeling patterns or ontologies for representation of CSR practices or policies*. The themes included in the scope are: (1) *interventions*, e.g., models, norms or laws for CSR; (2) *population*, e.g. studies approaching CSR and social sustainability; (3) *expected results*, e.g. modeling constructs or patterns of CSR; and (4) *application*, e.g., to researchers, managers, entrepreneurs and enterprises interested in structured approaches for modeling CSR practices or policies.

2.2 Research Questions

We are particularly interested in answering the following research questions: *What are the current norms, laws, regulations or standards most commonly adopted as references to elaborate CSR practices in companies? What are the requirements for*

implementing CSR guidelines in practice? What conceptual modeling constructs (i.e. modeling patterns, frameworks, ontologies, etc.) available for explicit representation of CSR practices and how are these approaches classified?

2.3 Search Strategy

The search strategy consists of the definition of selection criteria for the literature sources, identification of digital libraries to be explored and definition of search terms. These steps are elaborated as follows.

- **Selection criteria for the literature sources:** we selected these sources based on index scores in Computer Science publications, combined with opinion of scholars and practitioners in the field.
- **Digital libraries:** IEEE Xplore, ScienceDirect, Scopus and Scielo.
- **Search terms:** we followed a process of defining, testing and adapting search terms, as each digital library has its search particularities. Some of the libraries use the search term to match index papers by a few metadata (i.e. title, abstract or keywords). However, some other libraries use the search term to index papers based on a full text search or based on all the metadata describing the publication.

2.4 Digital Libraries

Four electronic database sources were used to extract data for this research: *IEEE Xplore*, *ScienceDirect*, *Scopus* and *Scielo*. Despite the peculiarities of the Web forms provided by the original search string was: (“Social Sustainability” OR “Social Responsibility” OR “Corporate Social Responsibility” OR “CSR”) AND (“Ontology” OR “Conceptual Model” OR “Framework”).

2.5 Quality Assessment Criteria

Studies were selected based on answers provided to our research questions. Based on those questions, we derived some quality assessment criteria for selecting the papers, categorized as *inclusion criterion* (IC), *exclusion criterion* (EC) and *quality criterion* (QC). The *inclusion criteria* comprised studies about: (1) social sustainability and CSR; (2) experiments of CSR practices in large organizations; or (3) conceptual models, frameworks or ontologies for explicit representation of CSR practices or policies. The *exclusion criteria* subsumed studies that: (1) do not answer any of our research questions; (2) do not treat social sustainability or CSR; or (3) present duplicated, incomplete or inconsistent results. The *quality criteria* regard the impact and provenance of the publication venue and were used to select: (1) peer-reviewed studies published in journals, magazines or conferences, where the average impact factor of the journal publications was 0.8; (2) studies published in papers with more than four pages; and (3) studies published in the time period ranging from 2010 to 2018.

2.6 Study Search, Selection and Classification

The study selection was part of a four-step process illustrated in Fig. 1, comprising the following stages: (1) *search*, where the search strings were submitted to the search engines of the selected digital libraries, recalling 921 papers¹; (2) *selection*, when 60 duplicated papers were excluded, and titles, abstracts and keywords of the remaining 861 papers were reviewed, from which 711 were excluded; (3) *extraction and classification*, when a full text review was done on the 150 papers and the quality assessment criteria were applied, leaving 17 papers for the final extraction and classification stage. The data extraction aimed to identify information in the publications that could somehow answer our research questions. For each publication, we collected information about the goal of the study, motivation to include the study in the final review, and the form of the conceptual modeling contribution to CSR (e.g. laws, norms, modeling patterns, ontologies or best practices).

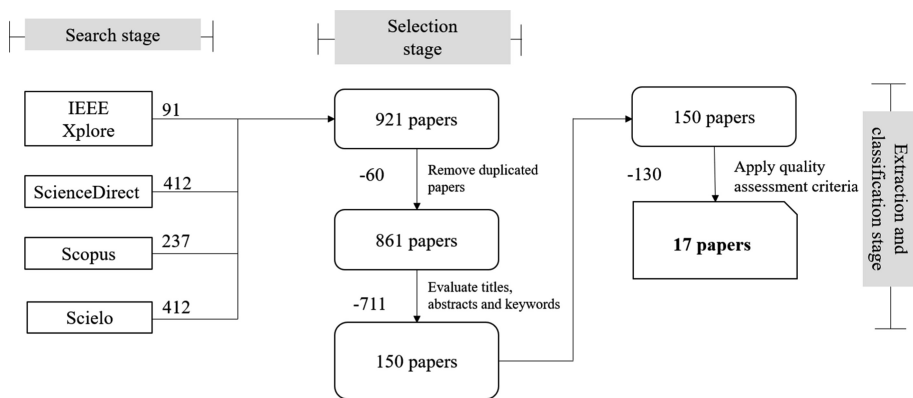


Fig. 1. Paper search and selection process.

3 General Report

The most general finding is that all the 17 studies considered for the final extraction and classification of modelling approaches are aligned with the overall goal of CSR, that is to promote sustainable social development through organizational action, under requirements defined by Ethics, society, shareholders’ interests, and compliance to international law and CSR standards. However, a more specific finding is that CSR practices are normally related to many disciplines, such as *Economics*, *Ethics*, *Law* and *Stakeholder’s Theories*, to name a few. These disciplines provide different perspectives on how CSR practices can be used to return value to the Enterprise. For instance, *Economic* and *Law* principles for CSR are often referred to as necessary for the

¹ A full list of the papers used in this research is available online at: <http://bit.ly/2KWIpZN>.

short-term sustainability of the organization. Regarding principles of *Ethics* and *Philanthropy*, however, these may leverage corporate reputation in a short-term, but only in a long-term may cause a positive impact on Enterprise sustainability. Moreover, from a *Stakeholder's Theory* perspective, CSR practices normally involve different types of organizational actors, such as business partners, competitors, consumers, government bodies, investors, regulators and shareholders. Nevertheless, the adoption of CSR practices by enterprises may trigger different types of conflicts amongst those organizational actors.

Additionally, it is important to observe the frequency of publications about this topic within the last decade. During the time period considered for study selection, a higher number of contributions to this research topic were published between 2012 and 2014. For reasons falling beyond the scope of this paper, the publication rate of the last year of analysis is equivalent to the one of the first year. Considering that sustainability and its three dimensions (i.e. Economic, Environmental and Social) are concerns of increasing interest for many disciplines, it is questionable why contributions of conceptual modeling for CSR have not evolved progressively.

4 Review Results and Discussion

In this section, we attempt to answer the main research questions of this study by categorizing the final 17 papers selected for data extraction and classification. The studies are organized in two subsections: one for conceptual modelling approaches (i.e. modelling patterns, conceptual frameworks, methods, ontologies, etc.) and another one for laws, norms and standards for CSR proposed by international organizations.

4.1 Conceptual Modelling Approaches for CSR

In Table 1, we summarize the contributions of conceptual modeling found for explicit representation of CSR practices. We indicate the type of Information System artifact and its context of intervention, e.g. experimental validation, implementation or knowledge and technology transfer in real-world assets.

4.2 Norms, Laws and Standards for CSR

Below, we provide an overview of international organizations and CSR documents considered as the most prominent for research in Business Information Systems:

- **Social Accountability International (SAI):** *is a global non-governmental organization advancing human rights at work. SAI's vision is of decent work everywhere, sustained by an understanding that socially responsible workplaces benefit business while securing fundamental human rights*².

² <http://www.sai-intl.org/>.

Table 1. Summary of conceptual modelling approaches for CSR.

Authors	Conceptual modeling approach	Contribution
Cazeri <i>et al.</i> [6]	A <i>conceptual model</i> to evaluate the integration between CSR practices and enterprise resource planning in Brazil, validated by experts' opinion	The conceptual model could potentially enhance CSR practices of a company in general
Venturelli <i>et al.</i> [7]	A <i>method</i> to classify the maturity level of CSR practices implemented by an organization. The method is supported by an expert system implemented with Fuzzy Logics	A CSR implementation score based on aggregation of performance indicators of three areas of the organization: human capital, business strategy and business performance measures
Mitsuzuka <i>et al.</i> [8]	A <i>method</i> to find CSR activities related to corporate value using a machine learning technique. It used 36 CSR activities from the TOYO KEIZAI database as resources	The method explains how RSC activities related to corporate value might influence one another
Malandrino and Sessa [9]	An <i>ontology</i> to describe competences necessary to implement CSR practices in enterprises. The ontology describes patterns of competency that can be used to derive key performance indicators	The ontology was used to formalize organizational practices of CSR that might lead to improvement of business performance
Guimaraes, Severo and Vasconcelos [10]	A <i>framework</i> to identify CSR resources on the business strategy level and to formulate Global Reporting Initiative (GRI) indicators	Demonstrated that CSR practices contribute to business success and increases market competitiveness
Yin and Jamali [11]	A <i>conceptual model</i> to analyze the business impact of CSR practices implemented by multinational companies operating in China	Evaluated Chinese companies regarding adherence to CSR practices
Hurtado <i>et al.</i> [12]	A <i>tool</i> that facilitates the construction of a communications framework to adjust the alignment of corporate social responsibility (CSR) in the company-stakeholder relationship	Demonstrated that a fit strategy of CSR practices might have a positive impact on corporate reputation
Krisnawati <i>et al.</i> [13]	A <i>conceptual model</i> based on GRI, Balanced Scorecard and Performance Prism indicators to assess CSR goals of a company's shareholders	The proposed model helps to assess how CSR practices could benefit each company's shareholder individually

(continued)

Table 1. (continued)

Authors	Conceptual modeling approach	Contribution
Maas and Rentiers [14]	A <i>conceptual framework</i> based mainly on the recently published ISO 26000 standard	A practical tool for organizations to perform self-evaluation and detection of gaps in their CSR policies
Raufflet, Cruz and Bres [15]	A <i>method</i> to define CSR practices in compliance to international standards	Evaluated the method regarding its effectiveness for CSR compliance checking
Yaldo et al. [16]	An <i>ontology</i> for automatic generation of GRI reports	The ontology is used for checking completeness, correctness and consistency of the concepts and relationships among the data
Na and Jian [17]	A <i>conceptual model</i> to assess the influence of CSR on brand value based on structural equation modeling for testing relations among the dimensions of CSR	Reported that consumers' perception on a company CSR practices can improve company brand value
Zhao et al. [18]	A <i>system</i> of CSR performance indicators	Provided explicit relations between CSR practices and corresponding performance indicators
Soiraya [19]	An <i>ontology</i> to classify Green Information Technology and Communication resources based on CSR reports	The ontology was used to identify patterns of configuration of Green ICT
Friendlieb and Touteberg [20]	A <i>framework</i> that involves different groups of stakeholders, both internal and external to a company, in the process of defining and evaluating CSR quality	The framework helps to produce sustainability reports to overcome the shortcomings of existing standards and guidelines
Li et al. [21]	A <i>framework</i> of indicator for evaluation of CSR practices, based on a blend of concepts proposed by Carol (1991) and found on the ISO 26000 standard	The model helps to assess the capability or maturity level of CSR practices of a company
Xie and Sims [22]	Identified a practical <i>strategy</i> for CSR activity management	Predicts that strategy will make multinational companies more proactive to implement CSR practices

- **International Organization of Standardization (ISO):** the ISO 26000 standard³ characterizes the social responsibility of a company by its decisions and actions taken in benefit of society and environment, followed by ethic and transparent behavior.
- **Global Reporting Initiative (GRI)**⁴: GRI's core products are the Sustainability Reporting Standards, which are made available as a free public good. They have been continuously developed over 20 years and represent global best practice for reporting on economic, environmental and social issues.
- **World Business Council for Sustainable Development (WBCSD)**⁵: WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. Their goal is to make member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

5 Conclusions and Future Research

This study aimed to survey conceptual modelling approaches for explicit representation of CSR business practices. By applying a systematic literature review protocol, 17 studies addressing this topic more directly were identified in conjunction with some major international standards in the field. Some of these studies have been demonstrated and evaluated as effective on leveraging business with positive social reputation.

The main threats to validity of this study regards constraints on the classification of IT artifacts of interest (i.e. conceptual modelling artifacts) and the type of target publications (i.e., only peer-reviewed publications). To cope with the first issue, this study can be extended with a quest for alternative types of IT artifacts (e.g., business process models, key performance indicators, business values, use cases, business rules, etc.). For the second issue, it is possible to extend this research with non-peer-reviewed publications, e.g., software documentation, surveys, interviews, expert opinion reports or white papers. Yet, the publication rate on the research topic did not increase. This is opposite to global concerns of sustainability on the design of Information Systems.

Finally, only three ontologies were found. Ontologies enable communication and consensus not only in Information Systems, but also among people. The lack of expressive contributions in this field indicates that the conceptual modeling foundations for CSR are still premature and probably scattered through probably conflicting applications in Business Information Systems. Nevertheless, ontology validation is a research area in its own, encompassing tasks such as *verification* (of completeness, correctness and consistency), *conformance checking* (practical, theoretical or technological) and *evaluation* (of acceptance, usability and utility). The three CSR ontologies found in the literature were not reported as a result of formal ontology validation

³ <https://www.iso.org/standard/42546.html>.

⁴ <https://www.globalreporting.org/>.

⁵ <https://www.wbcsd.org/>.

processes. Therefore, there is a research gap on ontologies for explicit representation of CSR vocabularies to ground the design of sustainability-aware applications in Information Systems.

References

1. Carroll, A.B.: A three-dimensional conceptual model of corporate performance. *Acad. Manag. Rev.* **4**(4), 497–505 (1979)
2. Carroll, A.B.: The pyramid of corporate social responsibility: toward the moral management of organizational stakeholders. *Bus. Horiz.* **34**(4), 39–49 (1991)
3. Cai, S., Miao, Z., Xu, D.: Sustainable development: a quest for logistics social responsibility among Chinese manufacturing firms. In: 2011 8th International Conference on Service Systems and Service Management (ICSSSM), pp. 1–6. IEEE (2011)
4. Biolchini, J.C., Mian, P.G., Natali, A.C.C., Conte, T.U., Travassos, G.H.: Scientific research ontology to support systematic review in software engineering. *Adv. Eng. Inform.* **21**(2), 133–151 (2007)
5. Kitchenham, B.: Procedures for performing systematic reviews, vol. 33, pp. 1–26. Keeled University, Keeled, UK (2004)
6. Cazeri, G.T., et al.: An assessment of the integration between corporate social responsibility practices and management systems in Brazil aiming at sustainability in enterprises. *J. Clean. Prod.* **182**, 746–754 (2018)
7. Venturelli, A., Caputo, F., Leopizzi, R., Mastroleo, G., Mio, C.: How can CSR identity be evaluated? A pilot study using a Fuzzy Expert System. *J. Clean. Prod.* **141**, 1000–1010 (2017)
8. Mitsuzuka, K., Ling, F., Ohwada, H.: Analysis of CSR activities affecting corporate value using machine learning. In: Proceedings of the 9th International Conference on Machine Learning and Computing, pp. 11–14. ACM (2017)
9. Malandrino, O., Sessa, M.R.: Ontology-based model sustaining competence management within corporates: competence certification in CSR. In: ICALT, pp. 525–527. IEEE (2017)
10. Guimaraes, J.C.F.D., Sivero, E.A., Vasconcelos, C.R.M.D.: Sustainable competitive advantage: a survey of companies in Southern Brazil. *BBR. Braz. Bus. Rev.* **14**(3), 352–367 (2017)
11. Yin, J., Jamali, D.: Strategic corporate social responsibility of multinational companies' subsidiaries in emerging markets: evidence from China. *Long Range Plan.* **49**(5), 541–558 (2016)
12. Hurtado, J.C.H., Ferris, X., Airman, N., Medjidie, D.: Communications and corporate social responsibility: a canvas to build its strategy. In: 2015 10th Iberian Conference on Information Systems and Technologies (CISTI), pp. 1–8. IEEE (2017)
13. Krisnawati, A., Yudoko, G., Bangun, Y.R.: Building a novel model of performance measurement system for corporate social responsibility towards sustainable development. In: 2014 IEEE International Conference on Management of Innovation and Technology, pp. 514–519. IEEE (2014)
14. Maas, S., Rentiers, G.: Development of a CSR model for practice: connecting five inherent areas of sustainable business. *J. Clean. Prod.* **64**, 104–114 (2014)
15. Raufflet, E., Cruz, L.B., Bres, L.: An assessment of corporate social responsibility practices in the mining and oil and gas industries. *J. Clean. Prod.* **84**, 256–270 (2014)

16. Yaldo, I., Dong, H., Woodbine, G., Fan, Y.: An ontological model for corporate social responsibility (CSR) reporting based on global reporting initiative GRI G4. In: Proceedings of the 25th Australasian Conference on Information Systems. ACIS (2014)
17. Na, H., Jian, L.: Research on the relationship between corporate social responsibility and brand equity—From the perspective of consumer cognition. In: 2013 International Conference on Management Science and Engineering 20th Annual Conference Proceedings, pp. 870–876. IEEE (2013)
18. Zhao, Z.Y., Zhao, X.J., Davidson, K., Zuo, J.: A corporate social responsibility indicator system for construction enterprises. *J. Clean. Prod.* **29**, 277–289 (2012)
19. Soiraya, B.: Semi-automatic Green ICT Ontology construction from CSR report. In: 2012 7th International Conference on Computing and Convergence Technology (ICCCCT), pp. 711–714. IEEE (2012)
20. Freundlieb, M., Toutedberg, F.: Evaluating the quality of web-based sustainability reports: a multi-method framework. In: 2012 45th Hawaii International Conference on System Sciences, pp. 1177–1186. IEEE (2012)
21. Li, C., Zu, B., Li, Z., Zhang, L.: Corporate social responsibility and social responsibility needs of stakeholders. In: 2011 International Conference on Remote Sensing, Environment and Transportation Engineering, pp. 192–196. IEEE (2011)
22. Xie, M., Sims, R.: An analysis of multinational corporations' corporate social responsibility strategies in China from an institutional, stakeholder and social contract perspective. In: 2011 International Conference on Business Computing and Global Informatization, pp. 278–281, July 2011