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DEA, balanced scorecard and intellectual capital including the gender dimension: A comprehensive list of indicators

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Abstract

One of the most significant problems in the development of quantitative models to assess the performance of decision-making units (DMUs) is the availability of information coded into variables and indicators that are proxies for the relevant dimensions of the models: resources or inputs, products or services or outputs, and heterogeneous contextual factors including environmental factors. Data envelopment analysis (DEA) and balanced scorecard (BSC) are two of the best-known and applied tools to model and measure the performance of DMUs. Within the information set requested to model the performance, the most critical and sensitive variables and indicators related to the *intangible* capital of organizations, which includes with a primary role the intellectual capital (IC). Although they are very different, DEA (based on linear programming) and BSC (including a set of indicators along four dimensions) have recently been combined to try to address the problem indicated earlier, namely, having a set of variables and indicators available to better measure the performance of DMUs. We apply a three-level methodology combining (i) a series of systematic reviews, (ii) a bibliometric analysis of all the published works found, and (iii) an analysis of the so-called *grey literature* contained in the reports of knowledge-based organizations. The main results obtained are (1) a comprehensive survey and mapping of all scientific works combining DEA, BSC, and IC including the gender dimension; (2) an *integral and inclusive list* integrating all indicators found in both published works and reports, reclassified according to the main dimensions of the IC.

Keywords: quantitative models; data envelopment analysis; balanced scorecard; intellectual capital; systematic review; gender; indicators

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1. Introduction

Quantitative techniques for measuring the best use of resources to produce goods and services, based on data envelopment analysis (DEA) and its developments, are widespread for the analysis of various productive and economic sectors (see, e.g., Dotoli et al., 2016; Mariz et al., 2018; Song and Liu, 2018; Daraio et al., 2019; Catalano et al., 2019; Boubaker et al., 2023). Efficiency, in general (Daraio and Simar, 2007), is based on the comparison of the output/input used by a given unit against the output/input of a benchmark, a possible efficient reference or frontier. DEA (Charnes et al., 1978) is a mathematical programming technique that calculates the relative efficiency of a set of decision-making units (DMUs) on the basis of observed inputs and outputs, which may be expressed with different types of metrics. The basic idea of DEA is to measure the efficiency of a specific DMU against its projection on the “efficiency frontier” estimated over all the DMUs analyzed. DEA is one of the most used efficiency analysis techniques in empirical studies. Since DEA is based on a few assumptions about the data-generating process, it allows the user to model the production process and to measure the efficiency of DMUs in a flexible way. The most efficient units are those that produce the maximum amount of outputs given the inputs or resources used, or those, which given the number of outputs produced, have used the minimum amount of resources.

One of the most critical aspects in the development of quantitative models for measuring efficiency, and more generally performance, is the representation of the production process being analyzed. For a good representation of the production process and its boundary, it is important to select the relevant variables that are the most important dimensions of the analysis. The choice of variables is crucial that represent the resources (*inputs*) combined and used in the production process to make goods and/or services (*outputs*), and the external or environmental factors (*contextual factors*) that are neither inputs nor outputs but can influence the performance of the production process.

Regardless of the methodologies used, the availability of detailed information about the resources (or inputs) used by the units of analysis to produce the outputs or services and information about the context in which they operate is very important for formulating performance measurement models appropriate to the complex production reality to which they relate. This is why the availability of *indicators* of different dimensions of the performance is important to modeling and estimating the efficiency and performance of DMUs.

A number of works (see, e.g., Tsang et al., 1999; Eilat et al., 2006, 2008) have attempted to combine DEA models with the so-called balanced scorecard (BSC) (Kaplan and Norton, 1992), which is one of the most widespread tools for measuring the performance of an organization.

The BSC (Yongvanich and Guthrie, 2006; Zahra, 1999; Voelpel et al. 2006; Ittner, 2008; Mehralian et al. 2018; Fink et al. 2005; Bose and Thomas, 2007) is a managerial tool composed of a collection of measures organized into groups. The measures are related to four major managerial perspectives and are aimed at providing top managers with a comprehensive view of their business. The four perspectives of the BSC are financial, customer, internal process, and learning and growth. BSC combines financial and operational measures and focuses both on the short- and long-term strategic objectives of the organization.

Integrating DEA and BSC (Asosheh et al., 2010; Amado et al. 2012; Chen and Chen, 2007) address three common goals:

1. achieving strategic objectives (effectiveness goal; see, e.g., Marlina and Tjahjadi, 2020);
2. optimizing the usage of resources to generate desired outputs (efficiency goal; see, e.g., Tan et al. 2017);
3. obtaining balance (balance goal; see, e.g., Pandey, 2005).

This is because DEA alone enables the attainment of goal # 2 by measuring efficiency based on inputs and outputs; while BSC enables the realization of the effectiveness goal (#1) by adding the strategic and managerial dimension, and goal #3 of balancing organizational, financial, operational, and strategic performance.

Knowledge, and in particular intellectual capital (IC), is the main wealth of organizations, especially in turbulent times such as the current ones. Given the importance of the topic, there has been considerable interest and scholarly production on the subject. This topic assumes particular importance when dealing with the so-called *knowledge-based* organizations, i.e., organizations in which knowledge plays a particularly significant role, within which innovative firms, research centers, or universities can be included. When related to this type of organization, IC is a term used to cover all the nontangible or nonphysical assets of an institution, including processes, innovation, patents, the tacit knowledge of its members and their capacities, talents and skills, the recognition of society, and its network of collaborators and contacts (Ramírez Corcólez et al., 2013).

Over the years, intangible assets have assumed considerable importance. Academic research has identified different methodologies to measure them. Several methods were proposed to measure the value of intangible assets and IC (Kaplan and Norton, 1992; Edvinsson and Malone, 1997; Sveiby, 2018; Roos et al., 1997). Sveiby (2010), building on Luthy (1998), provided an overview of the main methods for measuring intangible assets proposing four categories of measurement approaches:

- *Direct intellectual capital methods (DIC)*: These methods are based on the direct estimation, in monetary terms (monetary value), of the various components of the intangible assets.
- *Market capitalization methods*: These methods are based on the calculation of the difference between a company's market capitalization and its stockholders' equity. This is the value of its IC or intangible assets;
- *Return on assets methods (ROA)*: The difference between the ROA of the company and the industry average is at the basis of these methods. This difference is multiplied by the company's average tangible assets to calculate the average annual earnings from the Intangibles and after an estimation of the value of intangible assets or IC is derived.
- *Scorecard methods*: These methods are based on the identification of the various components of intangible assets or IC. Scorecard methods are in some way similar to DIC methods, but no estimate is made of the monetary value of the intangible assets. This is proposed starting from the BSC.

The performance of a knowledge organization has a *multidimensional nature* and requires an analysis based on multiple key performance indicators, so it can be measured by using a tool like the BSC. In addition, the assessment of the performance of knowledge organizations is related not only to the IC in its three dimensions of *human capital*, *structural capital (SC)*, and *relational capital* (Steward, 1994; Edvinsson and Malone, 1997; Johnson, 1999; Smith and Parr, 2000) but also to other financial and nonfinancial dimensions (Sydler et al., 2014; Jain et al., 2017).

The performance measurement of the IC is still at its “primary stage” of development, as observed by Lee and Wong (2019) who identify five quantitative approaches used in the literature including fuzzy logic, analytic hierarchy process, analytic network process, technique for order of preference by similarity to ideal solution, and DEA. More recently, Ferreira and Fernandes (2020) reviewed the emerging literature on the measurement of IC performance using multilevel approaches.

A problem less explored in the literature is the relationship between gender-related issues and IC. This is a pertinent question because IC is connected to the performance and sustainability of knowledge organizations. Moreover, the tools available to measure gender imbalance and diversity in this context are scarce. Many studies have looked at the impact of board gender diversity on the level of corporate social responsibility (e.g., Issa and Fang, 2019; Miles, 2011; Oware and Mallikarjunappa, 2021). The aspect of gender balance in companies has become increasingly important in recent years, but the indicators used in knowledge-based organizations are not treated according to the classification of IC, bringing the problem down to the human capital aspect only and so leading to a partial view of the problem.

In this paper, we attempt to bring together DEA, BSC, IC, and the gender dimension by providing, on the one hand, a comprehensive and up-to-date bibliography of existing literature on the topics and, on the other hand, providing a rich list of indicators to support the development of quantitative models that include more meaningful and detailed dimensions on IC and gender indicators. We integrate all these strands of the literature to add all the richness of BSC dimensions and indicators into the DEA approach, which is essentially quantitative. As we have seen above, a key dimension of the performance of organizations, especially knowledge-based ones is IC, including its gender component. The goal is to have the ability to formulate richer, inclusive (hence “comprehensive”) quantitative models of even the most difficult-to-quantify dimensions provided by the literature on IC and reporting on the gender dimension. Quantitative models, based on DEA and its developments, should incorporate vital dimensions related to IC and gender indicators to improve their accuracy and reliability.

The paper is organized as follows: the next section presents the main aim and contribution of the paper; Section 3 describes the methodology used, and Section 4 illustrates the main results; Section 5 concludes the paper; finally, the Appendix reports the information, queries, and list of references of the systematic reviews carried out.

2. Aim and contribution

The main aim of this paper is to provide a comprehensive list of indicators to support and improve the development of quantitative models of efficiency and performance assessment. Building on the existing literature and, in particular, on the studies that combine DEA and BSC, as the most important challenge we consider the inclusion in the quantitative models of the aspects that refer to *nontangible* or *nonphysical assets*, including processes, innovation, patents, the tacit knowledge of its members and their capacities, talents, and skills, the recognition of society, and its network of collaborators and contacts, which are called IC in the existing literature. The inclusion of these aspects in the quantitative assessment of the performance is a real challenge that can be achieved only if an adequate set of information (list of indicators) is made available to those who develop quantitative

models. In addition, including gender indicators would allow the analyst to develop models that take into account the sustainable development agenda developed by the United Nations, aiming at reducing gender unbalance and discrimination.

To reach the objective of our study we develop a *three-level* methodology that includes the following:

- (a) A series of *systematic reviews* to list and map the existing published literature on the topics of DEA, BSC, IC, and gender dimensions. A systematic review is defined as “a systematic and explicit review of the evidence on a formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant primary research, as well as to extract and analyze data from the studies included in the review” (Khan et al., 2001). Tranfield et al. (2003) showed the usefulness of systematic reviews of the literature in the field of management to develop evidence-based decision support systems. Petticrew et al. (2008) illustrate the specificities of systematic reviews applied in social sciences (see Section 3.1).
- (b) A *bibliometric analysis* of the overall published literature found in the previous step. Bibliometric analysis is a quantitative approach used to analyze bibliographic data (Broadus, 1987). Using characteristics such as an author’s total number of publications and citations, a topic, a university, and a nation, mapping analyses can provide a comprehensive picture. The number of publications indicates the volume of the published papers, the number of citations is a proxy for the impact, and popularity of the published papers considered (see Section 3.2).
- (c) An *expert-based analysis* of the *grey literature* including innovative company reports and gender balance sheets. The evolution of the reporting of innovative firms plays an important role in the identification of the main indicators that are related to the nontangible assets and IC dimensions (see Section 3.3).

The main outcome of our study is twofold: We offer the reader a rich bibliography of published studies on DEA, BSC, IC, and gender issues, along with their unified mapping, and we propose a rich and comprehensive list of indicators to measure intangible dimensions, linked to the different dimensions of IC by including the gender dimension. These two outputs can be useful to analysts who need to develop quantitative models to assess the efficiency and performance of a range of productive sectors, especially relevant to knowledge-based organizations that include innovative enterprises, universities, and research centers.

Figure 1 shows an outline of the organization of the content of the paper which highlights its contribution.

3. Methodology

The three-level methodology applied to reach the main objective of this paper, as summarized in Fig. 1 and in the previous section, is centered on an *enriched* systematic review methodology. First, we run a series of systematic reviews of the published literature. After that, we analyze their comprehensive outcome through bibliometric techniques. Finally, we integrate the indicators coming from the surveyed published literature with the indicators coming from the so-called *grey literature* that is reported in corporate documents and in the gender balance sheets.

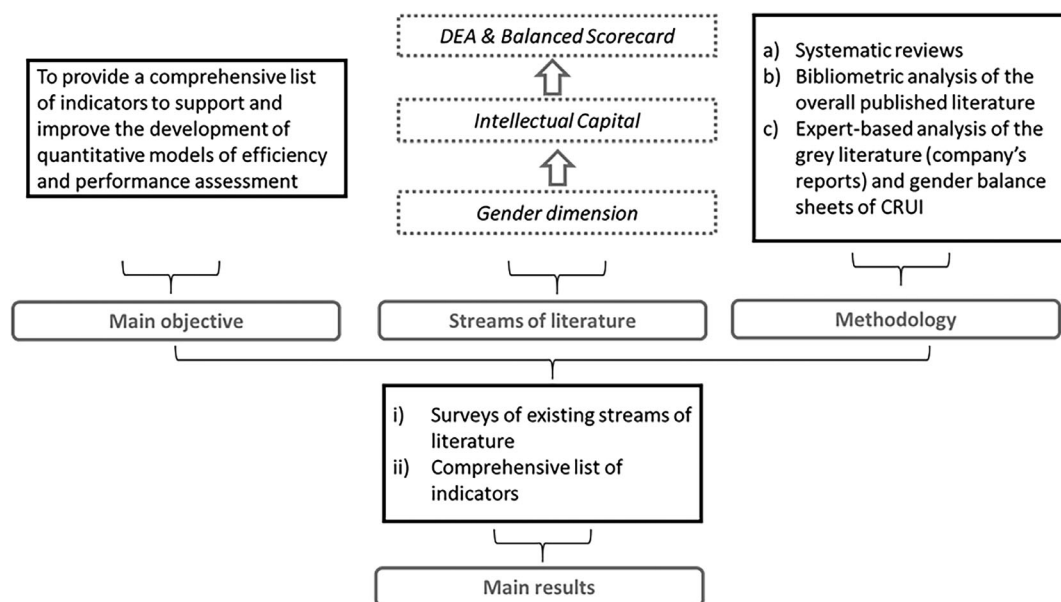


Fig. 1. An outline of the contribution of this paper.

3.1. Systematic review

We adopt the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2009) for systematic reviews. The main idea of the PRISMA is to have an explicit and reproducible methodology to do a systematic review in the medical sector but, considering the topic of our investigation, we appropriately adapted the PRISMA methodology to the typical characteristics of the topic of our interest based on what has been proposed by Petticrew et al. (2008).

Based on PRISMA and the adaptations described above, our systematic analysis involves the following steps:

- I. *Setting of predefined eligibility criteria,*
- II. *Selection of the information sources,*
- III. *Search strategy adopted,*
- IV. *Selection and screening,*
- V. *Bibliometric analysis,* and
- VI. *Presentation of results.*

We adopted article type and language as eligibility criteria. In our survey, only journal articles, and reviews written in English were considered in all the cases presented. The database consulted was Scopus (<https://www.scopus.com/>, accessed on November 6, 2022).

We started our analysis by searching the four main concepts related to our analysis, namely DEA, BSC, IC, and gender together. We purposely choose the word gender without a specific theme (e.g., gender gap or gender equality) to get as many contributions as possible.

Table 1

Summary of the articles retrieved according to the concepts selected for running the queries in the Scopus database. The “Prescreening results” column refers to the articles that meet the eligibility criteria. (For the exact keywords and queries used, see the Appendix.)

Topic 1	Topic 2	Topic 3	Topic 4	Number of articles in Scopus	Prescreening results	Abstract screening results	Not accessible	Discarded	Final number of articles retained
IC	DEA	BSC	GENDER	0	0	0	0	0	0
IC	DEA	GENDER		0	0	0	0	0	0
IC	BSC	GENDER		0	0	0	0	0	0
IC	BSC	DEA		0	0	0	0	0	0
BSC	DEA	GENDER		0	0	0	0	0	0
IC	DEA			51	44	44	6	38	38
IC	BSC			89	63	62	4	0	58
IC	GENDER			67	53	25	0	5	19
BSC	DEA			87	63	63	6	0	57
BSC	GENDER			4	3	1	0	0	1
DEA	GENDER			92	70	16	0	6	10

Abbreviations: BSC, balanced scorecard; DEA, data envelopment analysis; IC, intellectual capital.

This search did not lead to any results. Even organizing the search into smaller groups of three concepts (keywords) at a time (e.g., DEA, BSC, IC; or BSC, IC, and gender) was not successfully and we did not find any published paper concerning the three concepts together. Consequently, we “manually” reconstructed what has been proposed in the literature running “partial reviews” by combining two keywords at a time (e.g., DEA and BSC; BSC and IC; IC and gender).

Table 1 summarizes the different articles screened and selected in each partial review carried out. For each partial review, Table 1 details the number of contributions according to the topics (listed in the first four columns) searched on Scopus.

From the inspection of the existing literature, we observe a notable gap in the literature on the joint treatment of DEA, BSC, IC, and gender treated simultaneously: the first row of Table 1 shows that there are no published papers analyzing all these subjects together. Even if we eliminate one topic at a time, in different combinations, we still get no results (see rows 2, 3, and 4 of Table 1). Despite this, it is interesting to note that the gender issue, albeit with a limited number of contributions, has been addressed along with DEA, IC, and BSC.

The details on the queries used to retrieve the articles and the PRISMA scheme of each “partial review” carried out (and outlined in Table 1) can be found in the Appendix where the readers can find also the final list of relevant articles selected. After the “partial” reviews, all the articles selected have been joined into one single file CSV to be analyzed using bibliometric techniques.

3.2. Bibliometric Analysis

We elaborate through bibliometric analyses all the published articles retained after the selection and screening process in each “partial review” summarized in Table 1.

Table 2
Sample of the analyzed knowledge-based companies that have prepared an intellectual capital report

Company	Nationality	Type	Year
Celemi	Sweden	Consulting	2005
WM-data	Sweden	Consulting	1995/1996
PLS Rambøll Management	Denmark	Consulting	2005
Infosys	India	ICT	2007/2008
COWI	Denmark	Consulting	2004
Parco Trieste	Italy	Research	2010

All the bibliometric information of the articles (such as DOI, citations, and authors) have been collected from Scopus on November 9, 2022. To place the topics covered in the literature, we analyzed the main journals in the collected works.

Next, we analyzed the contents of the 10 most cited articles in the literature, useful for determining the trend of the most studied topics and for providing a potential chronological interpretation. Finally, we run a network analysis on the keywords using VOSviewer (Van Eck and Waltman, 2010). VosViewer is a software tool for constructing and visualizing bibliometric networks using a distance-based approach. In a network, the number of edges and the size of the node can be very different. For example, an important node, like a frequent keyword, can have more connections than its less popular counterparts.

3.3. The valuation of intellectual capital in corporate reports and gender balance sheets

In order to define the possible indicators that can be used for measuring the intangibles and IC and for evaluating the gender issue, it is necessary to start from the preexisting literature, including the nonacademic one. Since there are no academic works dealing with DEA, BCS, and IC nor for issues related to gender we drew from the *grey literature* (not indexed in existing databases) i.e., budget documents produced by knowledge-intensive firms on intangible assets and their measurement.

Beyond the methods that each company chooses to adopt to measure intangible assets, the company's goal was to create an *intellectual capital report*. This is a tool for measuring IC, useful for internal management and company knowledge management. In practice, this report takes the form of identifying a series of indicators, including but not limited to financial indicators. We analyze a sample of knowledge-based companies that developed the IC report over the years.

Table 2 shows the list of the six companies whose IC report was analyzed and the year in which they started to produce the IC report. The analysis of the IC reports highlighted the emerging need of companies to include, in addition to the three known components of IC, also an aspect related to the environment and the social impact of companies. This has shifted the focus from the IC report to the *sustainability report*. Therefore, corporate sustainability reporting is becoming a common business practice (KPMG, 2020; Ernst and Young, 2021; PricewaterhouseCoopers, 2021). The *sustainability report* is a tool useful to communicate to investors and other stakeholders the sustainability policies and activities of the company. Companies retain significant flexibility to disclose relevant information in the way that they consider most useful. To accomplish this, a variety

Table 3
Most frequent sources of the selected articles (top 10)

SOURCES	ARTICLES
<i>Journal of Intellectual Capital</i>	26
<i>Applied Mathematical Sciences</i>	5
<i>European Journal of Operational Research</i>	5
<i>Annals of Operations Research</i>	4
<i>Expert Systems with Applications</i>	4
<i>International Journal of Learning and Intellectual Capital</i>	4
<i>International Journal Of Productivity and Performance Management</i>	3
<i>Journal of Knowledge Management</i>	3
<i>Omega</i>	3
<i>Quality and Quantity</i>	3

of frameworks can be applied (e.g., European Commission, 2009; ISO 26000, 2010; OECD, 2018; COP, 2019). However, corporate reports based on Global Reporting Initiative (GRI, 2015) are the main framework applied by firms to communicate clear standardized information related to their environmental, social, and economic performance to all stakeholders.

The evolution of the reporting adopted by firms leads us to investigate the relationship between the sustainability report and the IC report and then the relationship between sustainability and the IC report and company performance.

We analyzed the sustainability reports of a sample of knowledge-based companies and the indicators used. In particular, we used the database “United Nations Global Compact” (available at <https://www.unglobalcompact.org/>), and we considered only companies in the sector “support service,” “Software & Computer Services,” and “Financial Service.”

The *sustainability report* is composed of the social, environmental, and economic dimensions. The economic dimension is the one that most involves the aspects of company performance. However, both human capital information and human capital investment decisions are linked to firm performance, reputation, and information asymmetry (Wyatt and Frick, 2010), and firms should therefore communicate this kind of information to increase their transparency (Cormier et al., 2009).

4. Results

4.1. Overview of the published literature reviewed

Downstream of the search and selection of articles on Scopus and combining all articles from the different search strategies implemented, we obtained 183 contributions of which 171 articles and 12 reviews. The 183 articles come from 117 different sources (an average of 1.5 articles per source). The time span of the surveys ranges from 1997 to 2022.

To investigate which are the main sources involved, details of the top 10 sources by contributions are given in Table 3. The most common source, with 26 articles, is the *Journal of Intellectual Capital*, a journal whose focus is on one of the main topics searched (IC). It is important to note, however,

Table 4

Top 10 articles by citation. The first column identifies the article, the second is the number of citations received according to Scopus (updated as on February 21, 2023)

Article	Total number of citations
Roos and Roos (1997)	678
Bontis et al. (1999)	537
Marr et al. (2004)	229
Eilat et al. (2008)	217
Eilat et al. (2006)	198
Tsang et al. (1999)	174
Kong (2008)	158
Asosheh et al. (2010)	124
Iazzolino and Laise (2013)	123
Arora (2002)	118

that several sources from operational and mathematical research (such as *Applied Mathematical Sciences* or *European Journal of Operational Research*) are also present in the table, indicating how these topics are of interest in these areas as well.

To understand the most influential contributions in the literature, we have summarized below the contents of the top 10 articles by citations received (see Table 4).

The most cited article is the one by Roos and Roos (1997) where the authors described how to measure a company's intellectual performance. They defined IC as the sum of the 'hidden' assets of the company not fully captured on the balance sheet. They are convinced that measures of IC will increasingly be at the forefront of discussing the health and value of a company.

In contrast, Bontis et al. (1999) conducted a review of the main tools available (in 1999) to measure and manage intangible resources. They analyzed four methodologies: IC, BSC, human resource accounting, and economic value added. For each methodology, they performed a critical analysis highlighting the advantages and disadvantages of the proposed tools. Given the interest in our work on IC and BSC, it is worth highlighting the advantages and disadvantages identified for IC and BSC.

For IC, the authors point out that it is a flexible, dynamic tool with possibilities for partial comparisons and application to nonprofit organizations. In contrast, they highlight the confusing literature and limited development of metrics and an excessive focus on actions, to the detriment of flows. For the BSC, the authors highlight how it has a powerful logic, a clear correlation between indicators and financial performance, and the developed literature. In contrast, they point out that it is rigid and static, has inadequate consideration of human assets and knowledge-creation processes, and does not allow for external comparison.

The third article is the one by Marr et al. (2004). They tried to improve one of the weaknesses highlighted in the previous work by proposing a visual representation (using a "map") of resources to understand how organizational resources are used to create value.

In contrast, Eilat et al. (2006) and later Eilat et al. (2008) focused on the integrated use of DEA and BSC in the context of R&D project evaluation. What the authors proposed in the two

different articles shows how a joint use of these two methodologies is very useful for the evaluation of alternatives and in project evaluation.

On the other hand, Tsang et al. (1999) compared DEA and BSC (as well as value-based measures and system audits) showing how these two tools (separated and not integrated as in the previous case) are very useful for evaluating maintenance performance but in different cases. They highlight that DEA is very useful for comparing the efficiencies of multiple organizations while BSC, value-based measure and system audits are appropriate in the case of a single organization.

The seventh most cited article is the one by Kong (2008), where the authors conducted a review of the main strategic tools to study the applicability of strategic management concepts, including SWOT (strengths, weaknesses, opportunities, and threats) analysis, industrial organization, resource-based view and core competencies, knowledge-based view, BSC and IC through the lens of strategic management development in the nonprofit context (social service nonprofit organizations). From the analysis carried out, the authors consider IC as an appropriate framework to be used in the social service nonprofit organizations environment.

In the next article (Asosheh et al., 2010), the authors proposed an integrated use of DEA and BSC for project selection in information technology. Iazzolino and Laise (2013) conducted a review to study from the perspective of the accounting methodological principles, the value-added intellectual coefficient (VAIC), introduced by Pulic (2000) as a measure of intellectual capital efficiency. Through this study, the authors described how VAIC calculates and interprets the efficiency of IC and what is its role in the performance of IC.

Finally, in the top 10 most cited articles there is the contribution by Arora (2002). The author proposes the use of BSC in the context of knowledge management.

The selected major contributions are very important mainly because of theoretical development, critical discussions, or methodological innovations, but the topic of gender is not addressed in any of these contributions. In order to understand better what the literature has proposed, Fig. 2 reports the keyword analysis of the selected contributions. In the network presented in Fig. 2, we can identify five main (interlinked) clusters:

- *Center-west cluster*: DEA and BSC. In this cluster, we can see how the main theme linking these two tools relates to decision-making and performance evaluation. In this case, the decision-making theme indicates how the joint use of these two approaches can be used by decision-makers in support or comparison/evaluation of alternative decisions.
- *South-east cluster*: The main argument of the articles in this cluster is IC and theory adopted in the selected works. Along with IC, we have the topic of intangible assets (IC being one of the main tools available to assess them), the theories behind and fields of application (i.e., gender or gender diversity). It is important to highlight the node “board gender diversity.” One of the main topics discussed with gender is the impact of gender in leadership roles. Interestingly, IC and gender are together in this cluster, indicating a joint treatment (in our selected papers) of these issues. Going back to Table 1, we note that the number of papers dealing with gender and IC together is higher than the other topics (19 vs. one for gender and BSC and 10 for gender and DEA).
- *North cluster*: The main theme here is about efficiency, with some nodes related to the application of efficiency in different fields. Efficiency is a theme connecting many of the topics covered (the node in terms of size is the largest, indicating a considerable presence of this keyword in the

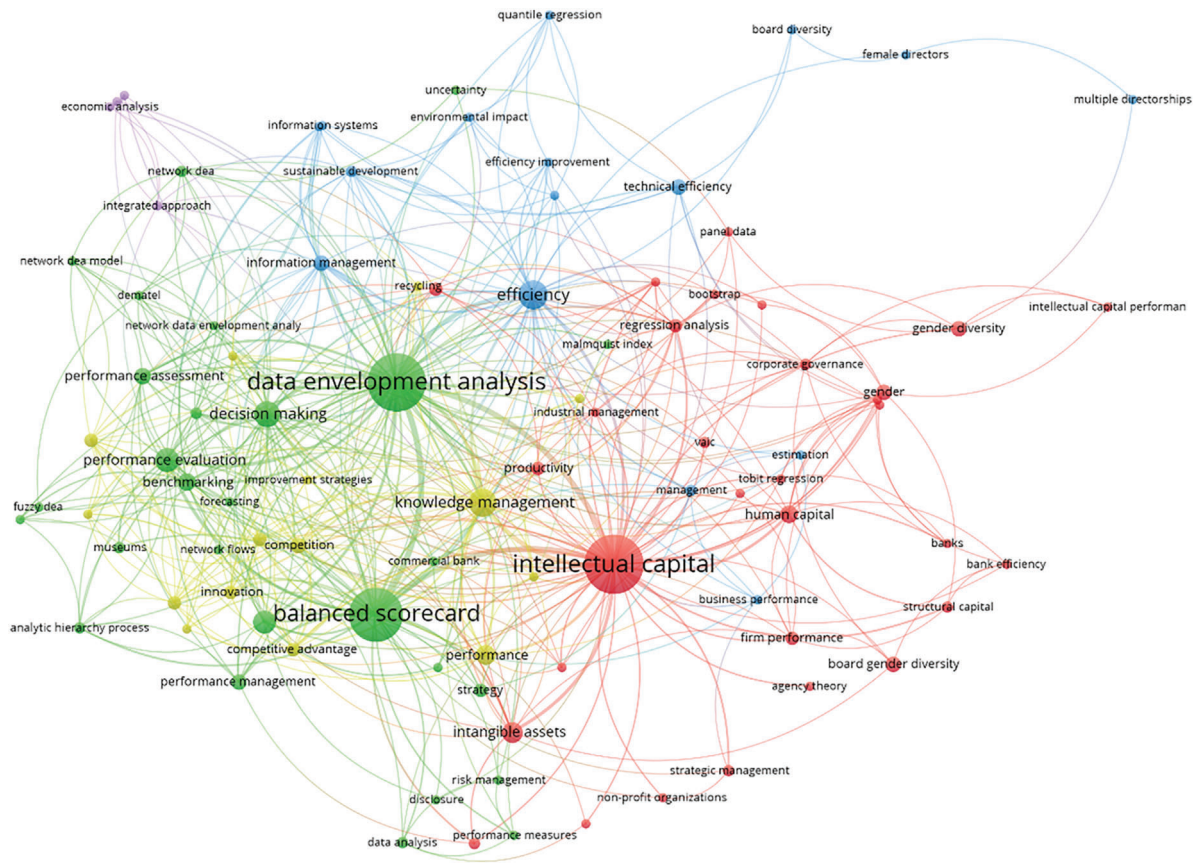


Fig. 2. Keyword analysis/network of the selected articles. The number of articles: 183, threshold keywords two, normalization: LinLog, attraction three, repulsion one, clustering resolution one, minimum cluster size two. Colour identifies different clusters.

analyzed works). The fact that efficiency and performance are linked but separated into two different clusters indicates how these themes are not always treated together in the literature.

- *Center*: Knowledge management and performance. An important strand of work has developed the topic of knowledge management with the topic of IC. This cluster indicates an important focus in the literature on performance evaluation and competitive advantage.
- *North-west* (and unrelated nodes): This cluster includes a minor group of underdeveloped topics related to economic analysis. This cluster, along with the well-known topic of female directors and multiple relationships has few linkages, identifying a weak connection with the main topics covered. We can define these topics as marginal or underdeveloped.

From the map, we can understand the state of the art in the literature, that is, how DEA and BSC in the literature are treated together. Gender and IC share many publications in common compared to gender and DEA/BSC. We can also see how IC is used in various areas, such as banks and firm performance, and that it is also connected with the theme of gender (and its declinations, such as

gender diversity). Although the theme of gender is present, we can see that the only declinations identified relate to the board gender diversity problem, but no contributions mention other issues such as gender balance or gender equality.

Despite the interest in the subject, there are, to the best of our knowledge, no contributions that provide a list of indicators to assess IC including the gender dimension. For this reason, in the next section, we have delved into IC indicators coming from the published literature, combining these with indicators coming from the sustainability reports and gender balance sheets of organizations (both public and private) to look for suitable indicators of the intangible assets that can be useful for a quantitative analysis of the performance of intensive knowledge firms or organizations.

4.2. A comprehensive list of indicators including the gender dimension

For developing quantitative models, the more challenging quantification refers to human capital including gender and intangibles. In the published literature, Lim et al. (2010) analyzed the importance given to 15 human capital indicators in the investment decision-making processes of fund managers. Cinquini et al. (2012) analyzed a sample of *sustainability reports* and found nine indicators related to human resources, characteristics of staff, staff satisfaction, educational level, and competence profile.

There are also some aspects related to structural capital, such as investments in R&D or the development of new products. The analysis of IC facilitates the measurement of the company's social relations. Therefore, we found some points in common with relational capital, such as customer growth and, in some ways, the brand image and reputation of the company. Cinquini et al. (2012) offer a list of IC items included in the sustainability reports.

Some studies found that IC plays a critical role between corporate social responsibility and financial performance. Nikolaou (2019) explains the relationship between the corporate environmental and financial performance highlighting the significance of some mediators such as social and environmental responsibility, IC, innovation, and competitive advantage. Trevlopoulos et al. (2021) identified a positive link between IC and corporate financial performance. All the main indicators that we identified in the gray literature based on the reports analyzed (listed in Table 1) and those reported in the literature cited in this section, including the performance indicators, are included in Table 5, and organized according to the main components of IC.

When reporting its management approach for diversity and equal opportunity, the organization can also describe the legal and socioeconomic environment that provides opportunities for, and barriers to, gender equality. Some of the indicators collected also seek to measure barriers related to the gender gap (share of female workers performing the organization's activities, their equal remuneration, and their participation at the highest governance level), but there are few indicators proposed.

To assess the problem of gender, we then investigated on how this issue is measured within public institutions. In 2003, the concept of “gender budgeting” in the context of public organizations was proposed by the European Union. Gender budgeting, as defined by the Council of Europe and the Commonwealth, is the implementation of the gender mainstreaming principle in the budget process. This entails assessing the gender effect of budgetary policies, including the gender viewpoint at all stages of the budgeting procedure, and restructuring revenues and expenditures to achieve

Table 5

Integrated set of indicators collected from different sources about universities and firms, organized by main dimensions of IC

Type of indicator	Indicator description	Source
Human capital	Scholar index	Lee (2010)
	Professional scholars recruited in a long-term	Lee (2010)
	Plan such as total number, fluctuation, and average duration of scientific scholars	Lee (2010)
	Staff index such as attitude, competence, and expenses for training, etc.	Lee (2010)
	Percentage of students with a technology background or with a business background	Secundo et al. (2010)
	Number of total students, or distinct in undergraduate students, master's students, Ph.D. students	Secundo et al. (2010)
	Number of hours of class per day	Secundo et al. (2010)
	Percentage of students satisfied with the organization	Secundo et al. (2010)
	Percentage of learners' complaints	Secundo et al. (2010)
	Number of courses per student	Secundo et al. (2010)
	Average age of students	Secundo et al. (2010)
	Number of new people recruited	Secundo et al. (2010)
	Percentage of job placement after six months from degree	Secundo et al. (2010)
	Number of alumni	Secundo et al. (2010)
	Percentage of students applying for more advanced programs	Secundo et al. (2010)
	Percentage of former students covering staff/faculty positions	Secundo et al. (2010)
	Number of faculty members or the number of staff members (research and administration)	Secundo et al. (2010)
	Average evaluation of faculty made by students	Secundo et al. (2010)
	Percentage of faculty graduated from the institution	Secundo et al. (2010)
	Number of hours dedicated by faculty to seminars	Secundo et al. (2010)
	Number of new people recruited	Secundo et al. (2010)
	Percentage growth of scientific staff	Leitner (2004)
	Average duration of scientific staff	Leitner (2004), Benzhani (2010)
	Number of staff involved in creative commons and social innovation project	Secundo et al. (2017)
	Number of start-ups/spin-offs founded by graduates/Higher Education Institution employees.	Secundo et al. (2017)
	Number of staff funded by competitively funded R&D projects	Secundo et al. (2017)
	Number of joint publications with nonacademic authors	Secundo et al. (2017)
	Number of postgraduate students and postdoctoral researchers directly funded by private businesses	Secundo et al. (2017)
	Number of staff with experience launching start-ups/spin-offs	Secundo et al. (2017)
	Percentage of staff teaching in European programs	Secundo et al. (2017)

Continued

Table 5
(Continued)

Type of indicator	Indicator description	Source
	Number of media appearances on public issues	Secundo et al. (2017)
	Number of academic staff involved in the regional planning	Secundo et al. (2017)
	Number of citizens attending workshops and scientific events	Secundo et al. (2017)
	Number of external stakeholders (managers, policymakers, etc.) involved in curriculum design and delivery.	Secundo et al. (2017)
	Employees' characteristics, training, skills, wellness	Cinquini et al. (2012, p. 543)
	Average hours of training per year per employee	<i>Gray literature</i>
	Program to improve employee skills and transition assistance programs	<i>Gray literature</i>
	Percentage of employees receiving regular performance	<i>Gray literature</i>
	Diversity of governance bodies and employees	<i>Gray literature</i>
	Ratio of basic salary and remuneration of women to men	<i>Gray literature</i>
	Incidents of discrimination and corrective actions taken	<i>Gray literature</i>
	Operations that have been subject to human rights reviews or impact assessments	<i>Gray literature</i>
	Employee training on human rights policies or procedures	<i>Gray literature</i>
	Significant investment agreements and contracts that include human rights clauses or that underwent human rights screening	<i>Gray literature</i>
	New employee hires and employee turnover	<i>Gray literature</i>
	Benefits provided to full-time employees that are not provided to temporary or part-time employees	<i>Gray literature</i>
	Parental leave	<i>Gray literature</i>
	Occupational health and safety management system	<i>Gray literature</i>
	Hazard identification, risk assessment, and incident investigation	<i>Gray literature</i>
	Occupational health services	<i>Gray literature</i>
	Worker participation, consultation, and communication on occupational health and safety	<i>Gray literature</i>
	Worker training in occupational health and safety	<i>Gray literature</i>
	Promotion of worker health	<i>Gray literature</i>
	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	<i>Gray literature</i>
	Workers covered by an occupational health and safety management system	<i>Gray literature</i>
	Work-related injuries	<i>Gray literature</i>
	Value Added/Total employees	<i>Gray literature</i>
	Value Added/ Professional employees	<i>Gray literature</i>

Continued

Table 5
(Continued)

Type of indicator	Indicator description	Source
	Revenue generated per employee	<i>Gray literature</i>
	Teleworking, agile work or smart working (law no. 81/2017)	CRUI gender balance sheet
	Activities of the recreational club of employees with impact on occupational well-being	CRUI gender balance sheet
	Training courses for the management to prevent discrimination and bullying	CRUI gender balance sheet
	Information, training, and awareness activities that increase the culture of equality and equal opportunity	CRUI gender balance sheet
	Training courses on gender issues	CRUI gender balance sheet
	Conferences, seminars, and summer schools on gender studies	CRUI gender balance sheet
	Promotion of the gender dimension in teaching activities	CRUI gender balance sheet
	Degree awards, scholarships, Erasmus programs on gender issues	CRUI gender balance sheet
	Activation of study courses on gender	CRUI gender balance sheet
	Activation of Ph.D. courses on gender (for Ph.D. students of all disciplines, in the field of soft skills)	CRUI gender balance sheet
	Public awareness activities (seminars, conferences) on issues of gender violence	CRUI gender balance sheet
	Orientation activities on courses of study in STEM disciplines specifically aimed at school students	CRUI gender balance sheet
	Research activities on gender studies	CRUI gender balance sheet
	Establishment of observatories to promote research and training from a gender perspective	CRUI gender balance sheet
	Basic and applied scientific research activities with gender impacts (e.g., gender medicine)	CRUI gender balance sheet
	Rules aimed at ensuring an equal presence of men and women in the University bodies, or at least a minimum threshold of presence for the underrepresented gender	CRUI gender balance sheet
	Monitoring of women's scientific careers and/or female career advancement of technical-administrative staff	CRUI gender balance sheet
	Initiatives to promote a balanced gender composition of speakers at seminars and conferences, and participants in panels or round tables, hosted or funded by the organization	CRUI gender balance sheet
	Mentoring programs	CRUI gender balance sheet
	Incentives for female participation in STEM disciplines conferences	CRUI gender balance sheet
	Rules that take into account periods of maternity, paternity, parental, and family leave in the internal evaluations, in particular, compulsory leave	CRUI gender balance sheet

Continued

Table 5
(Continued)

Type of indicator	Indicator description	Source
Structural/organizational capital	Measures aimed at reconciling life and work times	CRUI gender balance sheet
	Courses, seminars, and events that promote well-being at work	CRUI gender balance sheet
	Ph.D.s and master theses finalized	Leitner (2004), Benzhani (2010)
	Employees created by spin-offs	Leitner (2004), Benzhani (2010)
	Vision, its strategic deployments, processes, and routine management	Lee (2010)
	Information technology in service for supporting the research, teaching, and industrial cooperative practice	Lee (2010)
	Number of pilot applications developed	Secundo et al. (2010)
	%of success in project acquisition (on tot. presented)	Secundo et al. (2010)
	Number of ongoing research projects	Secundo et al. (2010)
	Number of publications in international conference proceedings or in international journals	Secundo et al. (2010)
	Number of spin-off companies, patents, international awards	Secundo et al. (2010)
	Number of software platforms for education/research	Secundo et al. (2010)
	Percentage of IT expenditure on total costs	Secundo et al. (2010)
	Number of PCs per student, per staff member, per faculty member	Secundo et al. (2010)
	Number of books available in the library	Secundo et al. (2010)
	Number of incubators co-owned by the university	Secundo et al. (2017)
	Number of patents, licenses, and trademarks co-owned by the university	Secundo et al. (2017)
	Success rate in R&D project applications	Secundo et al. (2017)
	Number of shared (open access) laboratories or buildings	Secundo et al. (2017)
	Number of events open to community/public	Secundo et al. (2017)
	Number of research initiatives with a direct impact on the community	Secundo et al. (2017)
	Purchase of intangible assets and property, plant, and equipment	Gray literature
	Software license	Gray literature
	R&D/Total revenue (%)	Gray literature
	R&D/Value Added (%)	Gray literature
	Technology Investment/Total Revenue (%)	Gray literature
Technology Investment/Value Added (%)	Gray literature	
Number of patents	Gray literature	
Value of new ideas	Gray literature	
Adaptation of spaces to ensure lighting and safety conditions to protect safety and well-being	CRUI gender balance sheet	
Risk assessment and prevention activities in the field of safety from a gender perspective	CRUI gender balance sheet	

Continued

Table 5
(Continued)

Type of indicator	Indicator description	Source
Relational/social capital	Organization's nursery schools or toy library	CRUI gender balance sheet
	Summer centers, after-school care, babysitting, and other services for children and young people affiliated with the Organization	CRUI gender balance sheet
	Financial contributions for costs incurred for summer centers, after-school activities, baby-sitting	CRUI gender balance sheet
	Financial contributions for the care and assistance of non-self-sufficient family members (e.g. disabled and elderly people)	CRUI gender balance sheet
	Number of granted licenses	Benzhani (2010)
	Academic relationship such as conference activities, international scientists	Lee (2010)
	Public relationship with social environments	Lee (2010)
	Industrial relationship to enhance the student's employment	Lee (2010)
	Number of students with international experience	Secundo et al. (2010)
	Percentage of international students	Secundo et al. (2010)
	Number of international staff members	Secundo et al. (2010)
	Number of agreements signed with international partners	Secundo et al. (2010)
	Number of countries with collaborations developed	Secundo et al. (2010)
	Percentage of international speakers invited to learning programs	Secundo et al. (2010)
	Number of faculty members in international conferences	Secundo et al. (2010)
	Research grants abroad (also as a percentage of scientific staff)	Leitner (2004)
	Number of conference participation	Leitner (2004), Benzhani (2010)
	Number of activities in committees, etc.	Leitner (2004), Benzhani (2010)
	Hit rate European research programs	Leitner (2004)
	New co-operation partners	Leitner (2004), Benzhani (2010)
Number of employees financed by noninstitutional funds	Benzhani (2010)	
Company reputation	Cinquini et al. (2012)	
Substantiated complaints concerning breaches of customer privacy and losses of customer data	<i>Gray literature</i>	
Noncompliance with laws and regulations in the social and economic area	<i>Gray literature</i>	
Ratios of standard entry-level wage by gender compared to local minimum wage	<i>Gray literature</i>	
Proportion of senior management hired from the local community	<i>Gray literature</i>	
Proportion of spending on local suppliers	<i>Gray literature</i>	

Continued

Table 5
(Continued)

Type of indicator	Indicator description	Source
	Revenue new customer/Total Revenue (%)	Gray literature
	Sales & Marketing expenses/Revenue (%)	Gray literature
	Brand image	Gray literature
	Customer satisfaction	Gray literature
	Number of companies co-funding research or education activities carried out in the organization.	Secundo et al. (2017)
	Number of corporate clients co-funding education of their staff	Secundo et al. (2017)
	Percentage of staff/students with qualifications obtained abroad.	Secundo et al. (2017)
	Number of partners (academic/nonacademic) in projects that do not generate income	Secundo et al. (2017)
	Number of institutions involved in a formal agreement with the university	Secundo et al. (2017)
	Number of university/partner institutions delivering joint degree programs	Secundo et al. (2017)
	Percentage of students engaged in inward and outward international mobility.	Secundo et al. (2017)
	Number of publications with co-authors from the industry	Leitner (2004), Benzhani (2010)
	Lectures (nonacademic)	Leitner (2004), Benzhani (2010)
	Measurement and lab services and expert opinions	Leitner (2004), Benzhani (2010)
	Open days at University facilities (Museums, Botanical Garden, etc.) for staff and family members and acquaintances	CRUI gender balance sheet
	Events, regulations, and activities aimed at integrating students, faculty, and technical-administrative staff from European or non-European countries	CRUI gender balance sheet
	Funding (European, national, regional, from private foundations) for research or teaching on gender studies	CRUI gender balance sheet
	Leasing of rooms and equipment	Leitner (2004), Benzhani (2010)
Other (financial performance)	Ratios of standard entry-level wage by gender compared to local minimum wage	Gray literature
	Proportion of senior management hired from the local community	Gray literature
	Financial implications and other risks and opportunities due to climate change	Gray literature
	Direct economic value generated and distributed	Gray literature
	Defined benefit plan obligations and other retirement plans	Gray literature
	Income generated from licenses	Leitner (2004), Benzhani (2010)
	<i>Financial assistance received from the government</i>	Gray literature

gender equality (Ghilardotti, 2003; Council of Europe, 2021). This instrument, which allows for the analysis and construction of public budgets from a gender perspective, stems from the reality that the budget is not a neutral tool, but rather reflects the distribution of power in society.

The gender budget is closely related to the sustainability budget, sharing the same form, objective, and recipients: the gender budget, like the sustainability budget, strives to produce an assessment of resource management as well as the effectiveness and efficiency of activities and expenditures made.

The gender budget may thus be viewed as an addition to the sustainability budget, which, in pursuit of its unique goal (the promotion of genuine and effective equality between men and women), combines the budget with gender variable analysis.

The European Union and member states (including Italy) are working hard to improve the situation in the university and research sectors, supporting the diffusion of this instrument through various means (and “gender equality” policies). For this purpose, the European Commission is dedicated to promoting gender equality in research and development. It is included in the European Commission’s Gender Equality Strategy for 2020–2025, which outlines the Commission’s large commitment to equality across all EU policies.

Although there is no formal requirement for public administrations in Italy to implement gender balance, its mandatory character can be derived from several regulatory provisions (Directive of 2007, d.lgs. no. 150/2009). In Italy, one of the mandatory elements of the performance report that administrations are required to publish by June 30 of each year is the gender balance. Despite its mandatory character, the regulations did not control the precise content. The different gender budget documents provided by various Italian universities over the years frequently do not agree in their internal content, varying from university to university and from year to year. Annual or triennial gender budgets, gender budget papers with attached reports and thoughts and other very brief documents with descriptive objectives can also be found (e.g., the gender budgets like Sapienza Università di Roma, 2018). Furthermore, it is possible to discover that, for certain institutions, the gender budget is included in the university’s social budget rather than as a separate document (e.g., in the social budgets of the University of Bologna, Alma Mater Studiorum, 2015).

This confusion in measuring remained until 2019 when the Conference of Italian University Rectors (CRUI) published specific guidelines for the preparation of this document. The CRUI Group for Gender Balance released the *Guidelines for Gender Balance at Italian Universities* in 2019 (Fondazione CRUI - Gruppo CRUI per il Bilancio di Genere, 2019) to standardize the situation and set criteria (CRUI Group for Gender Balance, 2019). The use of these principles allowed a certain degree of uniformity in the reporting of gender indicators. These gender indicators have been reclassified according to the three main components of IC, namely, human capital, structural capital, and relational capital and are reported in Table 5.

5. Conclusion, limitation, and further research

The main aim of the paper is to promote and improve the development of quantitative models for measuring efficiency in knowledge-based organizations, a context in which the performance assessment has to deal with typically *nonquantitative* data. So, in order to pursue this aim, the paper provides a “comprehensive” list of indicators that can allow the implementation of quantitative models to be carried out. By comprehensive list we mean a list of indicators that attempts to be

complete and include all the indicators available both in the published literature and the grey literature on the subject.

In this context we focused on IC and gender indicators that can allow analysts to develop models that take into account the sustainable development agenda developed by the United Nations, aiming at reducing gender imbalance and discrimination.

To reach the objective of our study, we developed a methodology made-up of three steps:

- (a) a series of *systematic reviews* to list and map the existing published literature on the topics of DEA, BSC, IC, and gender dimension;
- (b) a *bibliometric analysis* of the overall published literature found in the previous step; and
- (c) an *expert-based analysis* of the *grey literature* including innovative company reports and gender balance sheets.

The paper contributes to the literature as it proposes a coherent and comprehensive list of indicators organized along the main components of the IC (human capital, structural capital, relational capital) for knowledge-based organizations (including firms and universities). This framework includes gender indicators mapped to the three dimensions of IC.

Another important result of this work is the collection of all the works that have been published on the topics of DEA, BSC, IC, and gender. To the best of our knowledge, there are no published scientific works that propose a comprehensive list of indicators on the different components of IC, including the gender dimension, as a basic dataset of variables and proxies useful for developing quantitative models of performance measurement.

From a methodological point of view, there are approaches to estimate unobserved latent factors related to quality (e.g., Daraio et al., 2021). The list of indicators proposed in this paper can provide useful proxies for inclusion in performance models that are more realistic and close to the reality of the organizations to which they refer.

The research described in this paper is not exempt from limitations. At first, the analysis carried out has highlighted one of the most important limits of systematic reviews: They refer only to published literature that in many cases is not enough. In our case, we have integrated and enriched with the *grey literature*, very useful for providing practical aspects of the topic. Another limitation, also typical of systematic reviews, is that they become obsolete very quickly, even if in our case the analysis conducted was thoroughly done. We know that it is not easy to produce and diffuse research that is strictly up to date, considering also the technical times of writing and publication. A more technical limitation of systematic reviews is represented by the choice of keywords. This kind of choice is very crucial, as it introduces biases that, together with the selection criteria of the papers, can influence the quality of the selection of works and the final outcome.

As regards future research, it must be observed that the implementation of quantitative models can be attained only if an effort to “translating” the qualitative dimensions into quantitative indicators is made. The quantitative indicators can be expressed in monetary terms or simply in quantitative terms. Anyway, important work in preparing data has to be dedicated in order to be elaborated by the models. An interesting further research would be to develop an information system useful to keep updated the list of indicators, continuing the monitoring of the literature published and the evolution of the grey literature, like the reports of firms, existing on the subject.

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Appendix A: PRISMA schemes and references of the selected studies

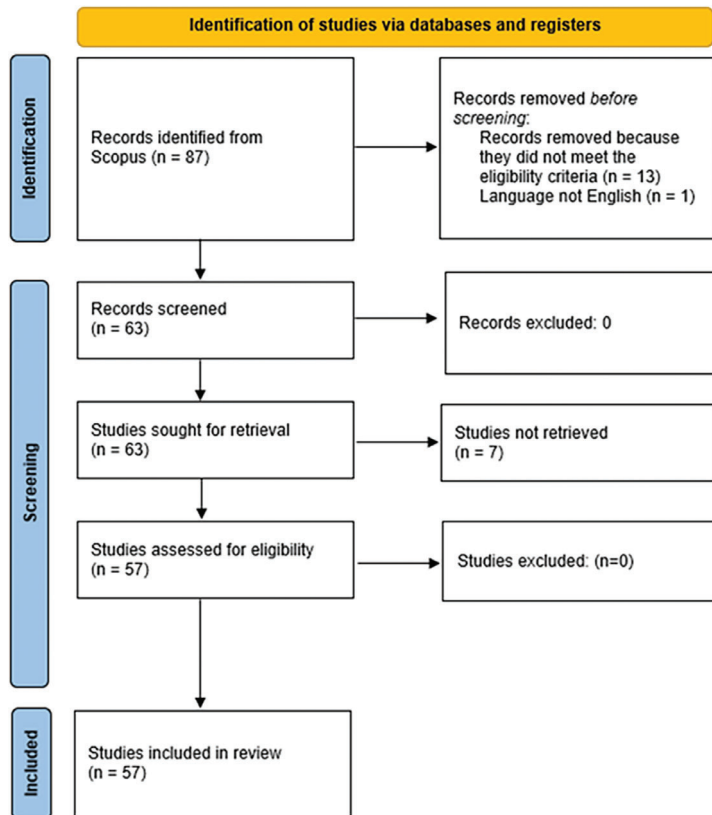
This section presents the queries made on Scopus, the PRISMA schema, and references of the selected articles coming from the six search scenarios adopted in the “partial” systematic reviews carried out. All the queries were performed on November 6, 2022.

A.1 DEA + BSC

A.1.1 Query

(TITLE-ABS-KEY(balanced AND scorecard) AND TITLE-ABS-KEY (dea)) AND (LIMIT-TO (DOCTYPE,“ar”) OR LIMIT-TO (DOCTYPE,“re”))

A.1.2 PRISMA scheme



A.1.3 Selected references

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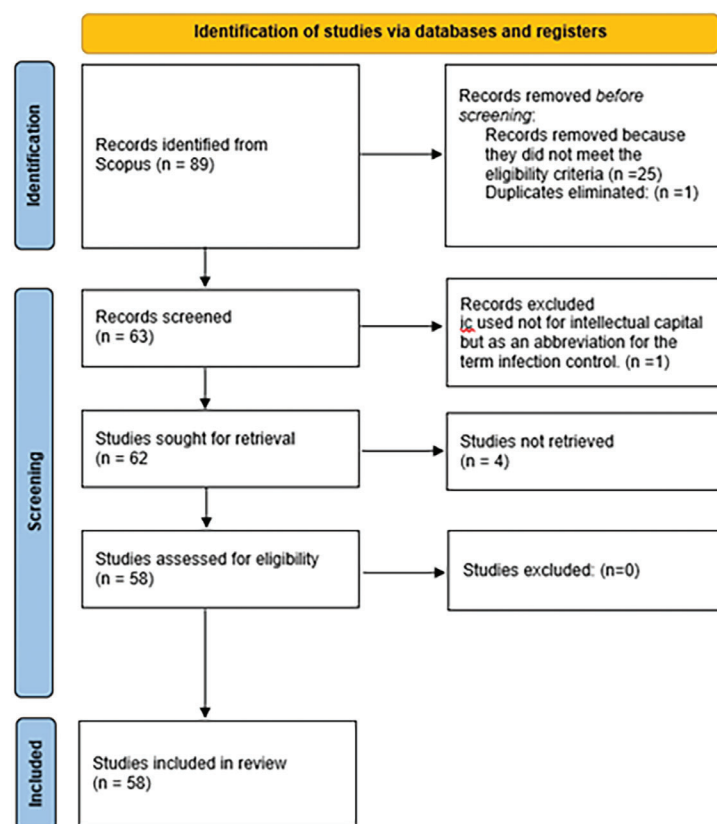
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A.2 BSC + IC

A.2.1 Query

(TITLE-ABS-KEY(“intellectual Capital” OR IC) AND TITLE-ABS-KEY(“Balanced Scorecard”)) AND (LIMIT-TO (DOCTYPE,“ar”) OR LIMIT-TO (DOCTYPE,“re”)) AND (LIMIT-TO (LANGUAGE,“English”))

A.2.2 PRISMA scheme



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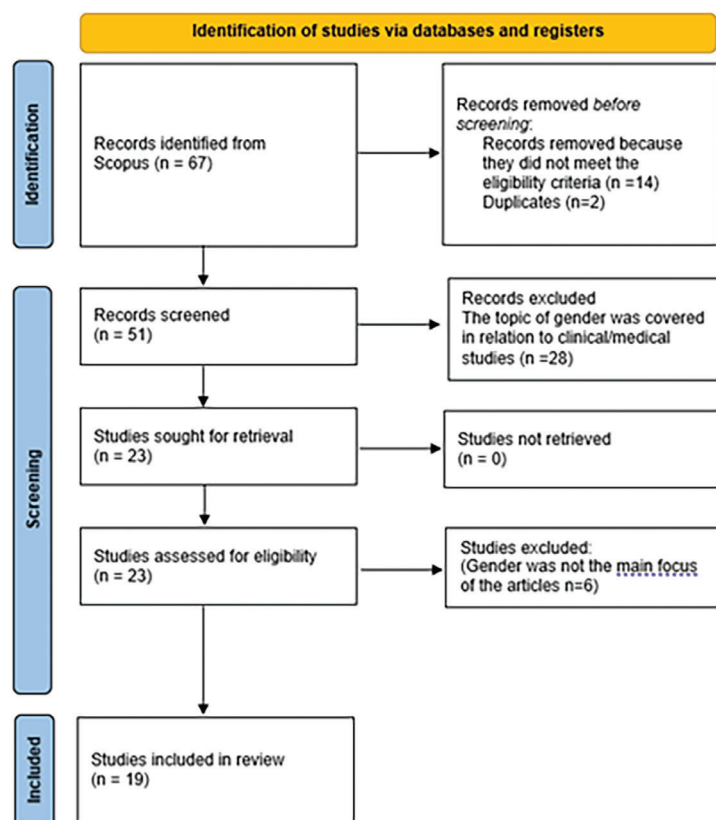
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A.3 IC + GENDER

A.3.1 Query

(TITLE-ABS-KEY(Gender) AND TITLE-ABS-KEY(“Intellectual Capital”)) AND (LIMIT-TO (DOCTYPE,“ar”) OR LIMIT-TO (DOCTYPE,“re”)) AND (LIMIT-TO (LANGUAGE,“English”)) AND (LIMIT-TO (SRCTYPE,“j”))

A.3.2 PRISMA scheme



A.3.3 Selected references

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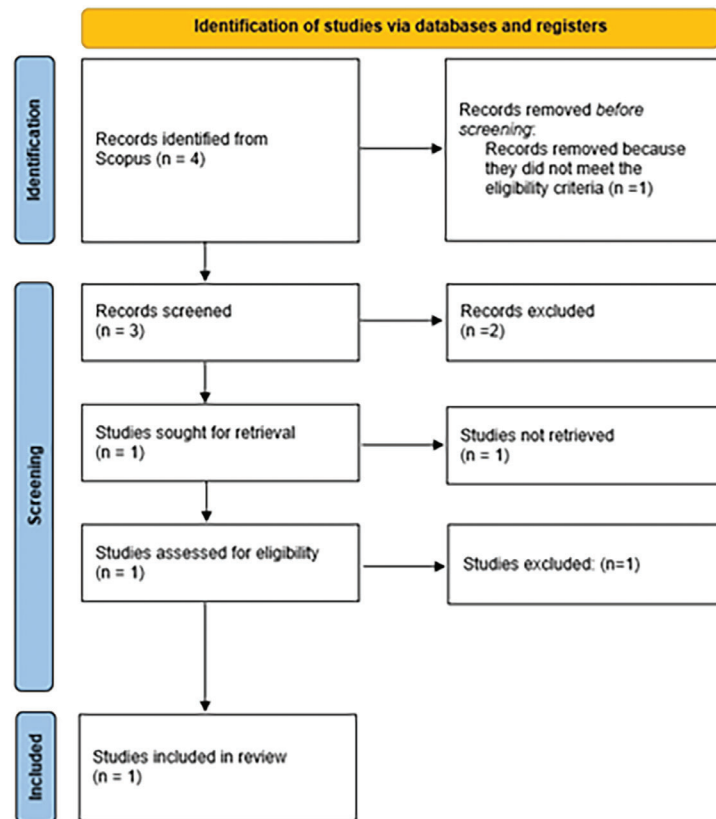
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A.4. BSC + GENDER

A.4 Query

(TITLE-ABS-KEY(Gender) AND TITLE-ABS-KEY(“Balanced scorecard”)) AND (LIMIT-TO (DOCTYPE,“ar”)) AND (LIMIT-TO (LANGUAGE,“English”)) AND (LIMIT-TO (SRCTYPE,“j”))

A.4.2 PRISMA scheme



A.4.3 Selected references

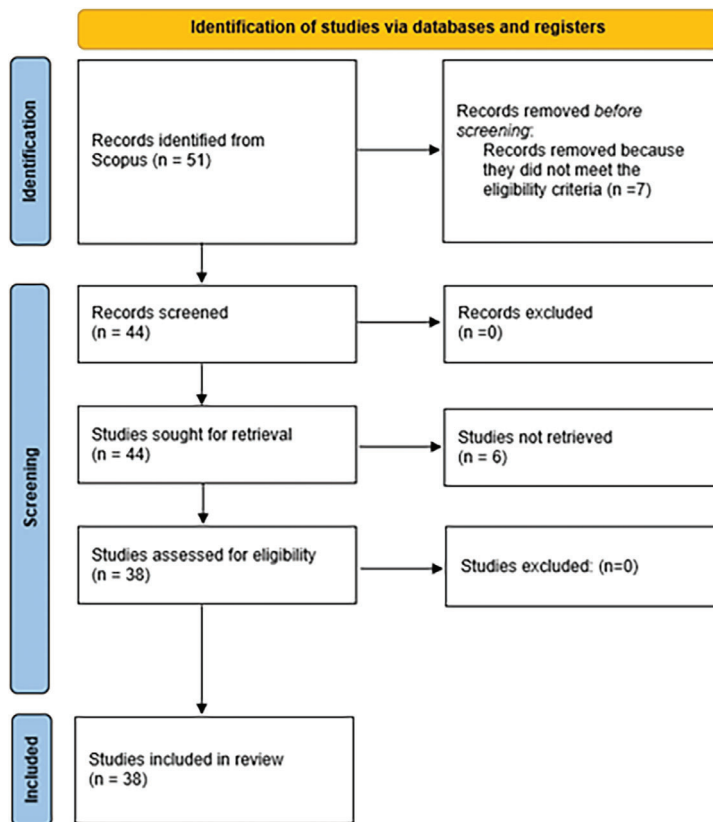
Ovseiko P.V., Edmunds L.D., Pololi L.H., Greenhalgh T., Kiparoglou V., Henderson L.R., Williamson C., Grant J., Lord G.M., Channon K.M., Lechler R.I., Buchan A.M., 2016. Markers of achievement for assessing and monitoring gender equity in translational research organizations: a rationale and study protocol. *BMJ Open* 6(1), e009022.

A.5 DEA + IC

A.5.1 Query

(TITLE-ABS-KEY(“intellectual Capital”) AND TITLE-ABS-KEY(DEA)) AND (LIMIT-TO (DOCTYPE,“ar”) OR LIMIT-TO (DOCTYPE,“re”)) AND (LIMIT-TO (LANGUAGE,“English”))

A.5.2 PRISMA scheme



A.5.3 Selected references

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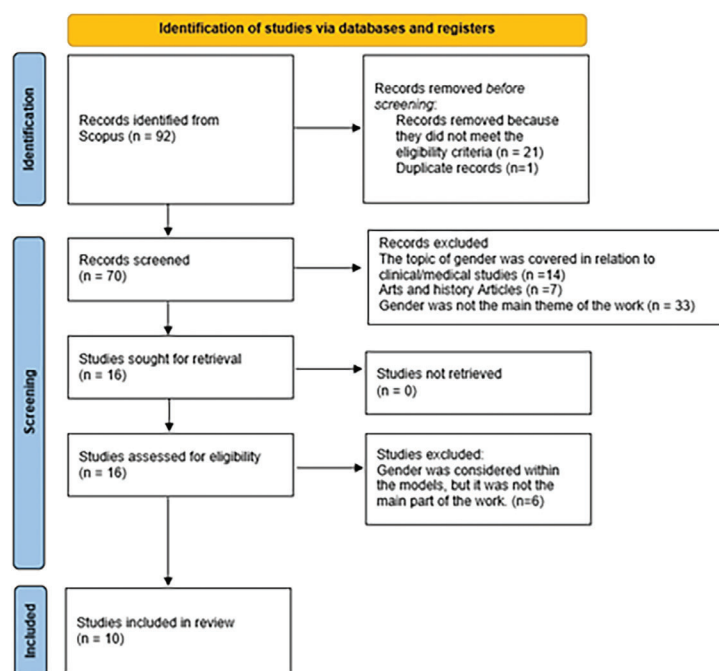
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A.6 DEA + GENDER

A.6.1 Query

(TITLE-ABS-KEY(DEA) AND TITLE-ABS-KEY(GENDER)) AND (LIMIT-TO (DOCTYPE,“ar”) OR LIMIT-TO (DOCTYPE,“re”)) AND (LIMIT-TO (LANGUAGE,“English”)) AND (LIMIT-TO (SRCTYPE,“j”))

A.6.2 PRISMA scheme



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