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Decision Tools: A Systematic Literature Review, Co-Citation Analysis and Future Research Directions

Abstract

Purpose – The purpose of this paper is to provide an extensive analysis of contributions to scholarly research on decision tools.

Design/methodology/approach – A systematic literature review was used to collect data from 47 articles published in peer-reviewed academic journals between 1980 and 2017. Co-citation analysis was adopted to analyse recent trends in research on decision tools and recommend a framework that places such research into three categories: mature, intermediate and nascent.

Findings – The research revealed that a majority of the studies on decision tools describe decision tool implementation in a single company or setting. It also provided a clear presentation of recent trends in the decision tools literature by categorising and comparing papers according to various salient features. The study of decision tools is classified into four macro clusters: (1) conceptualising and defining decision tools, (2) exploring the implementation of decision tools, (3) understanding the relationship between decision tools and other disciplines/approaches/initiatives, and (4) discovering the outcomes of decision tools. Furthermore, the framework proposed in this paper will help scholars identify issues that merit additional theory-building and/or theory-testing research.

Originality/value – To the authors' awareness this is the first paper to have adopted both a systematic literature review and co-citation analysis to identify the dominant trends and significant gaps in the field of decision tools research.

Keywords – Decision tools, systematic review, systematic literature review, co-citation analysis

Introduction

When faced with problems or challenges, organisational leaders often experiment with a multitude of ideas in the hope of discovering a favourable solution. One solution that management scholars and consultants have recommended to leaders is the use of decision tools, contending that all organisations should make them a central element of strategizing (Jarzabkowski and Kaplan, 2015; Rigby and Bilodeau, 2015). Decision tools have been defined as 'techniques, tools, methods, models, frameworks, approaches, and methodologies which are available to support decision-making within strategic management' (Clark, 1997, p. 417). In the current management literature, the terms decision tools (Clark, 1996), decision-making tools (Harfield et al., 2001), strategy tools (Cheng and Havenvid, 2017; Jarzabkowski et al., 2013; Knot, 2006), strategic management tools (Afonina, 2015; Afonina and Chalupský, 2013; Hansen, 2011; Williams and Lewis, 2008), management tools (Pors, 2008; Rigby and Bilodeau, 2005; Rigby, 1993), strategic management tools (Clark, 1997) and strategic planning tools (Aldehayyat, 2011; Kalkan and Bozkurt, 2013) are used interchangeably when referring to the same tools and techniques that are aimed at helping with strategising. Studies conducted by various management scholars (Haapalina et al., 2004; Gunn and Williams, 2007; Elbanna, 2007; Aldehayyat and Anchor, 2008; Aldehayyat et al., 2011) have revealed that the most widely used and popular decision tools amongst strategic decision-makers are Balanced Scorecard, benchmarking, PEST analysis, Porter's Five Forces Framework and SWOT analysis. The growing popularity of decision tools in recent decades has led to a proliferation of techniques that have been discussed at length in management text books and journals. It is virtually impossible to graduate from a business school in the 21st century without studying a few of the popular decision tools, such as SWOT analysis, the value chain and Porter's five forces framework (Kachra and Schnietz, 2008). A few questions have, however, been raised about the relevance of such strategic tools (Baldridge et al., 2004; Hannah & Peredo, 2011; Starkey

& Madan, 2001). Such doubts inspired research on the topic by Jarzabkowski et al. (2013). The pervasiveness of decision tools is such that organisations are scarcely conscious of using them during their strategic decision-making (Whittington, 2006).

Many studies have been conducted on the influence of decision tools on strategy formulation and implementation (Grede and Davis, 2016; Knott, 2008; Muñoz-Porcar et al., 2015; Rajasekar and Al Raee, 2014; Williams and Lewis 2008). Bain & Company has even created a business out of surveying the use of strategy tools around the world (Rigby, 2005). Due to the popularity of decision tools, studies have been conducted on their usage in many countries, including Oman (Rajasekar and Al Raee, 2014) and South Africa (Grebe and Davis, 2016). Decision tools are now commonly implemented within the public sector (Williams and Lewis, 2008), agriculture (Shadbolt, 2007), asset renewal (Muñoz-Porcar et al., 2015), and other areas that have traditionally shown less interest. Most studies of strategy tools have been conducted by scholars in a small number of Western countries. The resulting knowledge has subsequently circulated to other parts of the world as part of the centre-periphery continuum in management knowledge production (Alatas, 2003; Usdiken, 1996). Subsequently, an increasing number of researchers have made valuable contributions in the context of their respective countries, notably Al-Ghamdi (2005), Aldehayyat et al. (2008), and Grebe and Davis (2016).

Many recent publications in respected journals, such as those by Qehaja et al. (2017) and Vuorinen et al. (2018), have focused on reviewing strategy tools. However, the focus of the present paper goes beyond a straightforward literature review. It provides an extensive analysis of the latest contributions by analysing recent trends in decision tools research and proposes a framework that categorises decision tool studies as mature, intermediate, or nascent, based on their positioning in the research life cycle. The earliest article is by Booms and Bitner (1980), while the most recent

publications include those by Cheng and Havenvid (2017) and Qehaja et al. (2017). We followed the guidelines recommended by Tranfield et al. (2003) for conducting management research using a systematic literature review (SLR). This differs from other literature review styles such as the methods adopted by Aldehayyat and Anchor (2011), Cooper (1982, 1988), and Kunisch et al. (2015). Furthermore, we adopted the framework proposed by Edmondson and McManus (2007), which is highly beneficial for studies focused on the lifecycle of research topics, as the aim was to categorise, scrutinise, and compare the various studies on decision tools. The SLR approach, also adopted by Danese et al. (2017), Yang et al. (2016) and Newman et al. (2017), helped us with our comprehensive categorization and comparison of the literature on decision tools based on attributes including the year of publication, journal of publication, research method, authors, affiliated institutions, author country and sector of focus. Using SLR allowed for a deeper exploration of the literature on decision tools, as it helped to ascertain the most productive countries in terms of the number of publications on the topic, variety of problems explored, and research methodology adopted.

A thorough exploration of the literature on decision tools revealed that no other authors have used SLR. To the best of our knowledge this paper is the first to do so. The outcome of the research is to reveal gaps in the decision tool literature that could inspire future studies.

We adapted the work of Danese et al. (2017) to focus on the following three research questions (RQs):

- RQ1: What characteristics and directions are the focus of recent publications on decision tools?
- RQ2: How can the research lifecycle be used to categorise the publications on decision tools?

- RQ3: What recommendations can inform scholars about future research needs?

The next section of the paper focuses on the methodology used to undertake this research, followed by a statistical analysis of the data collected to answer RQ1. The gaps revealed through the data analysis are also discussed. The frameworks of Edmondson and McManus (2007) and Danese et al. (2017) are then used to classify the decision tool literature to answer RQ2. Following a critical discussion of the results generated by a statistical analysis of the data, suggestions are offered on potential directions for future research, thereby answering RQ3. The final section of the paper discusses the conclusions drawn from the findings.

Methodology

We adopted a systematic literature review (SLR) methodology (see Appendix 1, provided as online supplement), as described by Denyer et al. (2008), Macpherson and Jones (2010), Tranfield et al. (2003), and Danese et al. (2017). Co-citation analysis was also utilised as a bibliometric tool through a network analysis approach. The SLR's meticulous and structured approach has many advantages compared with conventional and less structured literature reviews. Many top tier scientific journals have given extensive coverage to works that use the SLR methodology, such as those focused on purchasing and entrepreneurial learning (Wang and Chugh, 2014), innovation (Adams et al., 2015), lean management (Danese et al., 2017) and supply chain management [SCM] (Chicksand et al., 2012). Based on the wide acceptance and approval of the SLR methodology in the conduct of scientific research, we deemed it to be the most appropriate and suitable approach for the current study. The sequence of stages is described below, following Danese et al. (2017), Nolan and Garavan (2016), and Wang and Chugh (2014). The structured process is summarised in Figure 1.

Insert Figure 1 about here

Co-citation refers to the rate at which two papers are cited together by other articles or papers (Small, 2003; White and McCain, 1998). Scholars have deployed co-citation analysis for several decades and it is now one of the preferred methods for conducting scientific studies, allowing the analysis of how authors are cited together in the literature of a specific area of study (Raghuram et al., 2009). Co-citation analysis helps scholars to comb through several pairs of citations to identify the shared interests or themes of the relevant papers and guide future research directions (Ramos-Rodriguez and Ruiz-Navarro, 2004). The higher the frequency of co-citations associated with two documents, the higher the strength of co-citation, which increases the likelihood of the papers being semantically interconnected (Small, 2003; White, 1990). The co-citation analysis in this study was based entirely on references extracted from the articles identified in the systematic literature search. However, only references from academic journals were used, excluding references from books, magazines, conference papers and other 'grey literature'.

Furthermore, we adhered to the established workflow for the conduct of scientific mapping using bibliometric methods (Zupic and Čater, 2015). This was comprised of four steps: research design, compilation of bibliometric data, analysis and visualisation.

Step 1: Research design

The focus of this step is the identification of research questions and choosing appropriate methods. In the present case, the questions addressed a gap in the research on decision tools, and co-citation analysis was utilised to produce a network analysis with the help of VOSviewer software.

Step 2: Compiling bibliometric data

In this step, the focus is on identifying the appropriate database and deciding how to filter and export the bibliometric data (Zupic and Čater, 201). To achieve this, we created sub-sections that included selecting relevant databases and journals, extracting related articles (see Figure 1), and exporting bibliometric data.

Exporting bibliometric data

Co-citation analysis requires citations extracted from the reference lists of related articles. We manually exported the reference lists from the articles and considered only the journal articles in these lists.

Step 3: Analysis

The focus here is on cleaning the data, classifying subfields in a given field, and identifying and selecting appropriate bibliometric software (BibExcel, Sitkis, SciMat). In this study, the data were initially entered into a Microsoft Excel spreadsheet. Frequency analysis was the main method used to identify any spelling errors as we applied co-authorship analysis via source titles instead of source author(s). Errors in the database were corrected prior to the network analysis, which was adopted for its advantage in identifying the positions of actors in the field or community. BibExcel software was used because of its automated function for recording co-occurrence among citations, which simplified the network analysis.

Step 4: Visualisation

Scholars have two options to visualise the relationships between the actors in the community or field – network analysis and multidimensional scaling. We deemed network analysis to be the best option for helping to visualise the relationships amongst co-citations in the present

study, with the help of the VOSviewer software. Network analysis also allowed us to provide an automatic display of the strength of relationships within the network and to identify clusters and nodes in the field. Researchers can use network visualisation to identify the strength of the ties in an entire network and the location of a citation within a specific field. Node size and line thickness indicate the strength of the position of a node within a network, while the lines and node colour depict the occurrence of clustering (Van Eck and Waltman, 2010). The outlook of a network field, which can be identified through network visualisation, has been confirmed to possess a wealth of information for further exploration (Leung et al., 2017; Rauchfleisch, 2017; Zhao et al., 2017).

Conceptual boundaries

The first step in addressing the RQs was to define, clarify and refine the objectives and boundaries of the SLR (Denyer et al., 2008) and co-citation analysis. To explore and categorise the emerging trends and applications regarding decision tools, we considered all studies related to decision tools Consequently, this SLR included several articles related to decision tools, such as the implementation of decision tools in various contexts (e.g., manufacturing, service and healthcare) and processes (e.g., production, accounting and others).

Data collection and analysis

This focus of this step during the research process was to create an exhaustive database of articles related to decision tools to obtain an overview of the main characteristics of the recent literature. Creating a comprehensive database is useful for extracting data for analysis and further consideration (Danese et al., 2017). We conducted a thorough search through various databases and search engines such as Web of Science, JSTOR, Emerald Insight and Google Scholar for relevant publications using keywords such as <decision tools>, <strategic management tools>, <strategy tools>, <strategic planning tools> and other synonyms for decision tools used in the

literature. The inclusion and exclusion criteria used for selecting journal articles are reported in Table 1. In total, 47 papers published in academic journals between 1980 and 2017 (see Table 2) were reviewed.

Insert Tables 1 & 2 about here

Consistent with the guidelines proposed by Edmondson and McManus (2007), we carefully read the full text of each paper to 'find and organize the data according to the classification variables such as: year of publication; research topic; research methodology; country/ies of the research; research sector' (Danese et al., 2017, pp. 3-4). Microsoft Excel was used to record the relevant data, and care was taken to ensure accuracy and reliability (Nolan and Garavan, 2016; Wang and Chugh, 2014). Each paper was read independently, and the data collected and compiled into a database. The databases were then compared to find shared attributions. All differences identified in the databases were discussed, and appropriate action was taken to rectify discrepancies until the databases were synchronised through consensus.

Literature Analysis

This section presents the collected data and the state of current research (see RQ1).

General considerations: journal, year of publication, author(s)

The primary findings obtained from analysing the thematic codes are presented in the following section, such as journal title and year of publication. As shown in Table 2, *Strategic Change* had the highest number of articles on decision tools (n=5, 10.64%) and *Strategy &*

Leadership had the second highest number (n=4, 8.51%). Other journals with more than one publication on decision tools were *Management Decision* (n=3, 6.5%), *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* (n=2, 4.3%), *Management Research Review* (n=2, 4.3%), and *Procedia – Social and Behavioral Sciences* (n=2, 4.3%). Not surprisingly, most articles on decision tools appeared in journals oriented towards strategic management and strategy-related topics, as decision tools are commonly applied in strategic decision-making.

There was considerable diversity in the journals beyond the strategy domain that had published articles on decision tools (Table 2) (e.g., *Engineering Economics*, *Journal of Engineering*, *Design and Technology*, and *Rangelands*). This is indicative of a continuous interest in the subject, especially in other contexts, disciplines, and settings.

Figure 2 shows a growth trend in the number of articles published over the years, with the highest number of publications (n=6) recorded in 2017. Although the concept of decision tools appeared several decades ago, it remains of interest to researchers, with several papers published from different perspectives and dimensions. The number of articles published by authors and their country of origin were also examined. While most authors (n=60) contributed to only a single publication or paper, 9 authors contributed to 3 papers each, 1 author published 3 papers, and the most prolific author on decision tools published 6 papers. Table 3 shows the topics covered by the two most prolific writers on decision tools.

Regarding author country of origin, the UK accounted for 17 papers, the USA for 11, Finland for 7, New Zealand for 8 and Kosovo for 6. Among the papers, 67% were empirical, 22% were conceptual and 11% were review articles.

Insert Figure 2 and Table 3 about here

Theoretical perspectives

This section focuses on exploring whether articles are based on consolidated management theories. In this paper, theory refers to 'connections among phenomena, a story about why acts, events, structure and thoughts occur' (Sutton and Staw 1995, p. 378). Theoretical aspects are often analysed in literature reviews, as seen in Sarkis et al. (2011), Chicksand et al. (2012), and Kunisch et al. (2015). The argumentations, contributions, and references to existing theories or implications underlined in each of the papers were gathered and recorded under the variable 'theoretical perspective'. However, most (92%) of the papers analysed did not specifically mention the theories they adopted. Of the 8% that discussed a theoretical grounding, contingency theory, institutional theory, personal construct theory, and grounded theory each accounted for 2%.

Research context

Data on the empirical articles were collected under the variables 'research sector' and 'focus sector'. In 37% of the papers reviewed, the sector of focus was unspecified, while 31% examined both the manufacturing and service sectors, 28% focused solely on the service sector, and 4% focused on the manufacturing sector only. Recent papers have demonstrated the versatility of decision tools by applying them to a variety of sectors, and one paper applied them to the public sector (Williams and Lewis, 2008). Considering the complexities of organisational structures and managerial approaches in the public sector, further decision tool studies should be conducted in this context.

Country/(ies) of research

This section focuses on the countries that are discussed in the various research papers used in this study. It reveals the proportion of studies in the field that examine a single country and those that consider multiple countries (Danese et al., 2017). The review revealed that 45% of the studies focused on a single country, 2% focused on two countries, and 11% focused on three or more. The other papers (42%) either did not specify the countries where their samples were collected, or in the case of conceptual or review papers, this variable was inapplicable. Single-country studies include Elbanna (2007), who examined the nature and practice of strategic planning in Egypt based on responses from 120 organisations, and Grebe et al. (2016), who collected data on decision tool use through semi-structured interviews with chartered accountants in South Africa's mining industry. Multi-country studies include that of Roper and Hodari (2015), who collected data from companies in the USA, Europe, and the UK using interviews, observations, and document analysis, and Frost (2003), who used questionnaires to examine the use of strategic tools in small- and medium-sized enterprises (SMEs) in Western Australia, Singapore, Hong Kong and Malaysia. Clark (1997) conducted a comparative empirical study on the usage of decision tools among practitioner members of the New Zealand Strategic Management Society and the Strategic Planning Society of the UK.

Research methodology

This section synthesizes the methodological findings related to the research's approach, aims, and collection methods. The analysis revealed a diverse range of methodologies including surveys and case studies. The most preferred method of data collection was questionnaires (45%), with 15% combining interviews with questionnaires and 9% using interviews only. For the remaining papers, either data collection was not applicable or other methods were used.

Quantitative data was collected by 41% of the papers, qualitative data by 39%, and the remaining 20% used a combination.

Most of the studies (91%) offered a suggestive or preliminary theory, which was often an invitation for further work on the issue or a set of issues opened up by the study. However, only 9% of the papers provided a supported theory, thereby adding potential specificity, new mechanisms, or new boundaries to existing knowledge. This indicates that theory in the field of decision tools has been growing over the years, and that further research in the field is being encouraged.

Research content

Recent research on decision tools has investigated a diverse range of topics, questions, and problems in different contexts. In this section, we identify the most frequently debated issues in the decision tools literature. We analysed the variable 'research topic' to find common characteristics in the papers. The following four macro-clusters were recognised after critically reading the 47 publications and identifying the issues they explored: (1) conceptualising and defining decision tools (4%), (2) exploring decision tool implementation (50%), and (3) understanding the relationship between decision tools and other disciplines/approaches/initiatives (11%) and (4) discovering the outcomes of decision tools (31%), while 4% of the papers could not be readily categorised. See Table 4 for more details.

Insert Table 4 about here

Based on Figure 3 and our research experience, Table 5 synthesises the primary results of the literature analysis and highlights the key research gaps. Very few (8%) of the publications on decision tools were based on well-established theories, and there was also a serious lack of research in specific sectors, including the public sector (2%) and hospitality sector (2%). While a significant number of publications used data from more than one country, there is a continuing need for comparative and cross-cultural studies on decision tools. In addition, few studies analysed the social outcomes of decision tools and their sustainability, hence additional research in this domain is merited.

Insert Figure 3 and Table 5 about here

Toward a theoretical framework for the recent literature on decision tools

This section answers RQ2 by providing a framework that incorporates all of the recent research issues on the basis of their position in the research lifecycle. To this aim, the research issues are categorised into three groups or lifecycles, 'nascent, intermediate, and mature', following the variables included in Edmondson and McManus's framework (2007, p. 1160) and using VOSviewer to visualise the co-citation network. Four clusters automatically emerged from the results (Figure 4) and the articles represented by each cluster are found in Appendix 2 (provided as an online supplement). The colour of the nodes and lines (red, yellow, green and blue) show the occurrence of clustering within the network, while node size and line density show the strength of the position in the network (Van Eck and Waltman, 2010).

As noted by Edmondson and McManus (2007, p. 1159),

> *Mature theory encompasses precise models, supported by extensive research on a set of related questions in varied settings. Maturity stimulates research that leads to further refinements within a growing body of interrelated theories. The research is often elegant, complex, and logically rigorous, addressing issues that other researchers would agree from the outset are worthy of study.*

Edmonson and McManus (2007, p.1161) posited that nascent theory research often deals with

> *Topics for which little or no previous theory exists. These topics have attracted little research or formal theorizing to date, or else they represent new phenomena in the world* (Edmondson and McManus, 2007, p. 1161).

The same authors (Edmonson and McManus (2007, p.1165)) proceeded to argue that

> *Intermediate theory research draws from prior work—often from separate bodies of literature—to propose new constructs and/or provisional theoretical relationships. The resulting papers may present promising new measures, along with data consistent with the provisional theory presented*

Based on this framework, we found that most papers in the study are intermediate (n=28, yellow and green clusters), followed by mature (n=23, red), and nascent (n=6, blue). See Appendix 2 (provided as an online supplement).

Insert Figure 4 about here

As may be seen in Table 6, many studies in the mature group attempted to test hypotheses, so this type of research often focuses on the relationships between decision tools and outcomes. This group also includes studies that analyse the application of strategic tools and consider the practical use of strategy tools in organisations. Studies in the nascent group, by contrast, examine the implementation of decision tools in new contexts, antecedents of the adoption of strategic tools, and selection/rejection criteria for decision tools. The present paper makes a theoretical contribution by showing that supporting information can be of substantial benefit to researchers in their future studies by strengthening their focus on either theory-building or theory-testing. Further details are provided in the next section.

Insert Table 6 about here

Future research opportunities

This section addresses RQ3 by considering the gaps identified in the recent literature which provide potential directions for future research (Table 5).

Concerning the first gap – the lack of use of existing consolidated theories – we identified a diverse range of promising theories borrowed from different fields of knowledge (Table 7). All of the theories in Table 7 are potentially useful for identifying new constructs and explanations, offering new lenses through which to interpret issues at the forefront of managerial debate in a robust and generalisable way. When focusing on theories already used in organisation management (OM) studies, researchers can take cues from existing studies, apply theories with greater

mindfulness, and use consolidated points and outlines to ground their research. There are endless possibilities for scholars to deploy creativity in applying these theories.

Insert Table 7 about here

While the main theories used in the articles considered in this study were contingency theory, grounded theory, institutional theory and personal construct theory, future researchers could apply less-used theories to explore the associations between new and existing variables, offering potentially unique and novel insights into the phenomena. Future research could also explore how to align decision tool practices with the information technologies adopted by a company, and how to improve the integration of corporate strategy, business processes and information systems.

The second gap concerns the need to reinforce research and explore new ideas. Healthcare is a valuable setting for decision tool research, as decision tools are widely known to improve the quality of patient care services. Future research could also go beyond the descriptive evidence of single case studies by shifting to the next phase of the research lifecycle framework. To address the third gap, it will be important to conduct comparative cross-country studies, as an increasing number of companies with plants in different countries face the challenge of transferring decision tools across geographically dispersed subsidiaries. Such transferral is complex and can be problematic.

Conclusions

This SLR of the decision tool literature identifies and analyses 47 articles published between 1980 and 2017 in top-tier scientific journals. As a first contribution, this research provides a clear depiction of recent trends in the decision tool literature by categorising and comparing papers according to a range of relevant features. Both dominant trends and significant gaps in the field are identified. Decision tool studies are classified according to four macro clusters: (1) conceptualising and defining decision tools, (2) exploring decision tool implementation, (3) understanding the relationship between decision tools and other disciplines/approaches/initiatives, and (4) discovering the outcomes of decision tools. Most of the studies analysed belong to the second content cluster, often describing decision tool implementation in a single company or setting (but not a specific process).

A second and unique contribution of the present paper compared with previous SLRs is the provision of an updated picture of the use of managerial theories in the field, and encouragement for the use of promising new theories. A third contribution of this SLR is the application of Edmondson and McManus' (2007) framework for classifying decision tools issues into nascent, intermediate and mature groups based on the research lifecycle model. By combining the gaps found in the decision tool research and the results emerging from the application of this research lifecycle model, this SLR study identifies some directions for future research in decision tools for each gap, as summarised in Table 8.

Insert Table 8 about here

The co-citation network indicates enduring scholarly interest in decision tools. Moreover, the high level of co-citation points to considerable research diversity in the field. The red spots on the density map cover a large area, showing that scholars are exploring various topics in diverse clusters within the decision tool field.

The decision tool field is a vast, swiftly evolving area of research. Although the decision tools concept is not new, to conclude that it has reached a mature phase in its research lifecycle would be an oversimplification that should be avoided, lest opportunities to explore more diverse study perspectives are lost. The field contains emerging issues and underexplored contexts deserving of further research. Future studies could also explore the rationale for the spikes and nosedives in the decision tools research exhibited in Figure 2. This could potentially help organisations with their strategic decision-making.

In conclusion, this SLR has adopted a clear and rigorous literature review approach and selected appropriate journals with care. Both conceptual and empirical articles were included to capture a wider range of aspects and behaviour in the field of decision tools. A limitation of this study is its focus on only those articles that met stringent quality and content criteria. Future studies could also analyse the growth pattern of research outputs, the yearly growth ratio, and the reasons for annual growth. Moreover, future studies could present data analysis results in more visual forms such as graphs, pie charts and infographics. Furthermore, the suggestions for future research included here were identified from the literature analysis. While this approach can limit creativity and innovation, SLRs can provide a good basis for brainstorming future streams of research to enrich the decision tool literature and offer support to managers.

References

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D. and Overy, P. (2015), "Sustainability-oriented innovation: a systematic review", *International Journal of Management Reviews*, Vol. 18 No. 2, pp. 180-205

Afonina, A. (2015), "Strategic management tools and techniques and organizational performance: findings from the Czech Republic", *Journal of Competitiveness*, Vol. 7 No. 3, pp. 19-36

Afonina, A. and Chalupsky, V. (2012), "The current strategic management tools and techniques: the evidence from Czech Republic", *Economics and Management*, Vol. 17 No. 4, pp. 1535-1544

Alatas, S.F. (2003), "Academic dependency and the global division of labour in the social sciences", *Current Sociology*, Vol. 51 No. 6, pp. 599-613

Aldehayyat, J. and Anchor, J. (2008), "Strategic planning tools and techniques in Jordan: awareness and use", *Strategic Change Journal,* Vol. 17 No. 7-8, pp. 282-293

Aldehayyat, J., Khattab, A. and Anchor J. (2011), "The use of strategic planning tools and techniques by hotels in Jordan", *Management Research Review,* Vol. 34 No. 4, pp. 477-490

Al-Ghamdi, S.M. (2005), "The use of strategic planning tools and techniques in Saudi Arabia: an empirical study", *International Journal of Management,* Vol. 22 No. 3, pp. 376-395

Baldridge, D.C., Floyd, S.W. and Markóczy, L. (2004), "Are managers from Mars and academicians from Venus? Toward an understanding of the relationship between academic quality and practical relevance", *Strategic Management Journal*, Vol. 25 No. 11, pp. 1063-1074

Booms, B.H. and Bitner, M.J. (1980), "New management tools for the successful tourism manager", *Annals of Tourism Research*, Vol. 7 No. 3, pp. 337-352

Cheng, C. and Havenvid, M.I. (2017), "Investigating strategy tools from an interactive perspective", *IMP Journal,* Vol. 11 No. 1, pp. 127-149

Chicksand, D., Watson, G., Walker, H., Radnor, Z. and Johnston, R. (2012), "Theoretical perspectives in purchasing and supply chain management: an analysis of the literature", *Supply Chain Management*, Vol. 17 No. 4, pp. 454-472

Clark, D.N. (1997), "Strategic management tool usage: a comparative study", *Strategic Change*, Vol. 6 No. 7, pp. 417-427

Clark, N. (1996), "Decision tools for public policy: can we do without economics?" *Journal of Economic Issues*, Vol. 30 No. 4, pp. 949-966

Cooper, H. M. (1982), "Scientific guidelines for conducting integrative research reviews", *Review of Educational Research*, Vol. 52 No. 2, pp. 291-302

Cooper, H. M. (1988), "Organizing knowledge syntheses: a taxonomy of literature reviews". *Knowledge in Society*, Vol. 1 No. 1, pp. 104-126

Danese, P., Manfe, V., Romano, P. (2017), "A systematic literature review on recent lean research: state-of-the-art and future directions", *International Journal of Management Reviews*, Vol. 20 No. 2, pp. 579-605

Defee, C.C., Williams, B., Randall, W.S. and Thomas, R. (2010), "An inventory of theory in logistics and SCM research", *International Journal of Logistics Management*, Vol. 21 No. 3, pp. 404-489.

Denyer, D., Tranfield, D. and Van Aken, J.E. (2008), "Developing design propositions through research synthesis", *Organization Studies*, Vol. 29 No. 3, pp. 393-413

Edmondson, A.C. and McManus, S.E. (2007), "Methodological fit in management field research", *Academy of Management Review*, Vol. 32 No. 4, pp. 1155-1179

Elbanna, S. (2007), "The nature and practice of strategic planning in Egypt", *Strategic Change,* Vol. 16 No. 5, pp. 227-243

Frost, F.A. (2003), "The use of strategic tools by small and medium-sized enterprises: an Australasian study", *Strategic Change,* Vol. 12 No. 1, pp. 49-62

Grebe, L. and Davis, A, (2016), "The use of strategy tools by chartered accountants in the South African mining industry", *Journal of Contemporary Management*, Vol. 13 No. 1, pp. 843-865

Gunn, R. and Williams, W. (2007), "Strategic tools: an empirical investigation into strategy in practice in the UK", *Strategic Change Journal*, Vol. 16 No. 5, pp. 201-216

Haapalina, I., Seppala, T., Stenfors, S., Syrjanen, M. and Tanner L. (2004) *Use of decision support methods in the strategy process – Executive view*. Helsinki School of Economics, Helsinki

Hannah, D.R. and Peredo, A.M. (2011), "Rethinking management education and scholarship", *Journal of Management Inquiry*, Vol. 20 No. 2, pp. 178-179

Hansen, J.R. (2011), "Application of strategic management tools after an NPM-inspired reform: strategy as practice in Danish schools", *Administration & Society*, Vol. 43 No. 7, pp. 770-806

Harfield, T., Driver, P. and Beukman, C.P. (2001), "Managing conflicting issues: a decision-making tool for technology adoption by VSEs", *Journal of Management Development,* Vol. 20 No. 10, pp. 830-841

Jarzabkowski, P., Giulietti, M., Oliveira, B. and Amoo, N. (2013), "We don't need no education – or do we? Management education and alumni adoption of strategy tools", *Journal of Management Inquiry*, Vol. 22 No. 1, pp. 4-24

Jarzabkowski, P. and Kaplan, S. (2015), "Strategy tools-in-use: a framework for understanding 'technologies of rationality' in practice", *Strategic Management Journal,* Vol. 36 No. 4, pp. 537-558

Kachra, A. and Schnietz, K. (2008), "The capstone strategy course: what might real integration look like", *Journal of Management Education*, Vol. 32 No. 4, pp. 476-508

Kalkan, A. and Bozkurt, Ç.Ö. (2013), "The choice and use of strategic planning tools and techniques in Turkish SMEs according to attitudes of executives", *Procedia – Social and Behavioral Sciences*, Vol. 99 No. 1, pp. 1016-1025

Knott, P. (2006), "A typology of strategy tool applications", *Management Decision*, Vol. 44, No. 8, pp. 1090-1105

Kunisch, S., Menz, M. and Ambos, B. (2015), "Changes at corporate headquarters: review, integration and future research". *International Journal of Management Reviews,* Vol. 17 No. 3, pp. 356-381

Macpherson, A. and Jones, O. (2010), "Editorial: strategies for the development of International Journal of Management Reviews", *International Journal of Management Reviews*, Vol. 12 No. 2, pp. 107-113

Muñoz-Porcar, A., Alonso-Nuez, M.J., Flores-García, M. and Duret-Solanas, D. (2015), "The renewal of assets using a tool to aid decision making", *Management Decision*, Vol. 53 No. 7, pp. 1412-1429

Newman, A., Donohue, R. and Eva, N. (2017), "Psychological safety: a systematic review of the literature", *Human Resource Management Review*, Vol. 27 No. 3, pp. 521-535

Nolan, C.T. and Garavan, T.N. (2016), "Human resource development in SMEs: a systematic review of the literature", *International Journal of Management Reviews*, Vol. 18 No. 1, pp. 85-107

Paul, K. (2008), "Strategy tools: who really uses them?" *Journal of Business Strategy*, Vol. 29 No. 5, pp. 26-31

Pors, N.O. (2008), "Management tools, organisational culture and leadership: an explorative study", *Performance Measurement and Metrics*, Vol. 9 No. 2, pp. 138-152

Qehaja, A.B., Kutllovci, E. and Pula, J.S. (2017), "Strategic management tools and techniques: a comparative analysis of empirical studies", *Croatian Economic Survey*, Vol. 19 No. 1, pp. 67-99

Raghuram, S., Tuertscher, P. and Garud, R. (2009), "Mapping the field of virtual work: a co-citation analysis", *Information Systems Research*, Vol. 21 No. 4, pp. 983-999

Rajasekar, J. and Al Raee, A. (2014), "Organizations' use of strategic planning tools and techniques in the Sultanate of Oman", *International Business Research*, Vol. 7 No. 3, pp. 159-177

Ramos-Rodriguez, A.R. and Ruiz-Navaro, J. (2004), "Changes in the intellectual structure of strategic management research: a bibliometric study of the strategic management journal, 1980-2000", *Strategic Management Journal,* Vol. 25 No. 10, pp. 981-1004

Rigby, D. (2005), "The Bain 2005 management tool survey", *Strategy & Leadership*, Vol. 33 No. 4, pp. 4-12

Rigby, D.K. (1993), "How to manage the management tools". *Planning Review*, Vol. 21 No. 6, pp. 8-15

Rigby, D. and Bilodeau, B. (2015), *Management: tools & trends*, Bain, London

Rigby, D. and Bilodeau, B. (2005), "The Bain 2005 management tool survey", *Strategy & Leadership,* Vol. 33 No. 4, pp. 4-12

Roper, A. and Hodari, D. (2015), "Strategy tools: Contextual factors impacting use and usefulness", *Tourism Management*, Vol. 51, pp. 1-12

Sarkis, J., Zhu, Q. and Lai, K.H. (2011), "An organizational theoretic review of green supply chain management literature", *International Journal of Production Economics*, Vol. 130 No. 1, pp. 1-15

Shadbolt, N.M. (2007), "The balanced scorecard: a strategic management tool for ranchers", *Rangelands*, Vol. 29 No. 2, pp. 4-9

Small, H. (2003), "Paradigms, citations, and maps of science: A personal history", *Journal of the American Society for Information Science and Technology*, Vol. 54 No. 5, pp. 394-399

Spina, G., Caniato, F., Luzzini, D. and Ronchi, S. (2013), "Past, present and future trends of purchasing and supply management: an extensive literature review", *Industrial Marketing Management*, Vol. 42 No. 8, pp. 1202-1212

Starkey, K. and Madan, P. (2001), "Bridging the relevance gap: aligning stakeholders in the future of management research". *British Journal of Management,* Vol. 12 No. 1, pp. S3-S26

Sutton, R.I. and Staw, B.M. (1995), "What theory is not", *Administrative Science Quarterly,* Vol. 40 No. 3, pp. 371-384

Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, Vol. 14 No. 3, pp. 207-222

Usdiken, B. (1996), "Importing theories of management and organization: the case of Turkish academia", *International Studies of Management & Organization*, Vol. 26 No. 3, pp. 33-46

Van Eck, N.J. and Waltman, L. (2010), "Software survey: VOSviewer, a computer program for bibliometric mapping", *Scientometrics*, Vol. 84 No. 2, pp. 523-538

Vuorinen, T., Hakala, H., Kohtamaki, M. and Uusitalo, K. (2018), "Mapping the landscape of strategy tools: a review on strategy tools published in leading journals within the past 25 years", *Long Range Planning*, Vol. 51 No. 4, pp. 586-605

Wang, C.L. and Chugh, H. (2014), "Entrepreneurial learning: past research and future challenges", *International Journal of Management Reviews*, Vol. 16 No. 1, pp. 24-61

White, H.D. (1990), "Author co-citation analysis: overview and defense". In: Borgman C.L. (ed) *Scholarly Communication and Bibliometrics*. Sage, CA, pp. 84-106

White, H.D. and McCain, K.W. (1998), "Visualizing a discipline: an author co-citation analysis of information science, 1972-1995", *Journal of the American Society for Information Science*, Vol. 49 No. 4, pp. 327-355

Whittington, R. (2006), "Completing the practice turn in strategy research", *Organization Studies*, Vol. 27 No. 5, pp. 613-34

Williams, W. and Lewis, D. (2008), "Strategic management tools and public sector management", *Public Management Review*, Vol. 10 No. 5, pp. 653-671

Yang, E.C.L., Khoo-Lattimore, C. and Arcodia, C. (2016), "A systematic literature review of risk and gender research in tourism", *Tourism Management*, Vol. 58 No. 1, pp. 89-100

Zupic, I. and Čater, T. (2015), "Bibliometric methods in management and organization", *Organizational Research Methods*, Vol. 18 No. 3, pp. 429-472

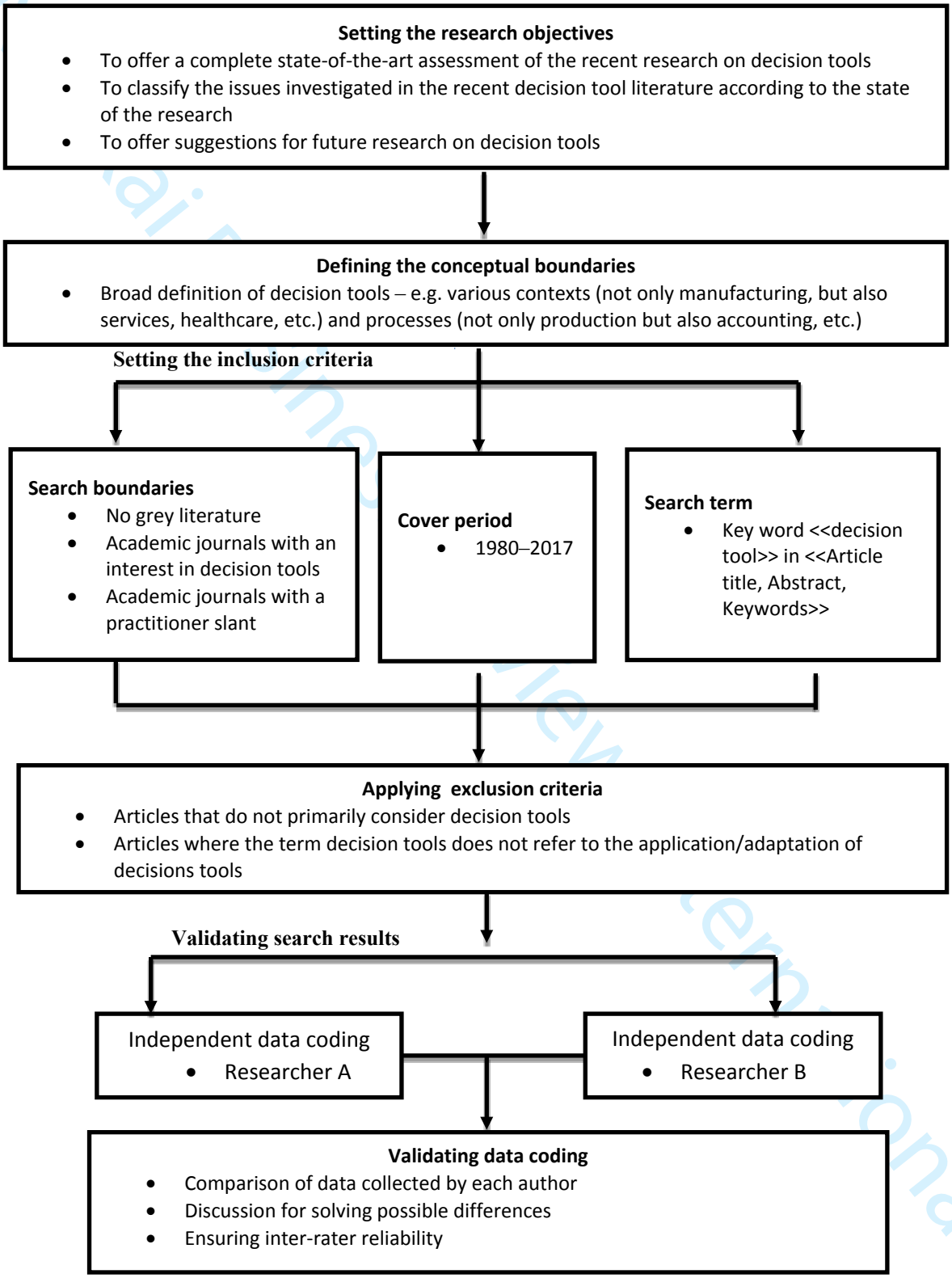

Figure 1: Summary of the SLR process

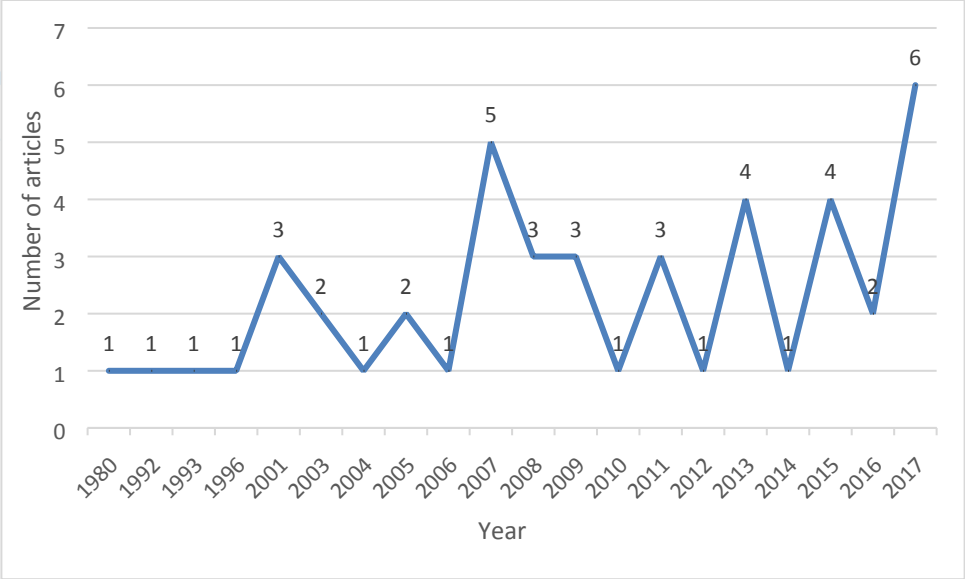

Figure 2: Distribution of decision tools articles by year

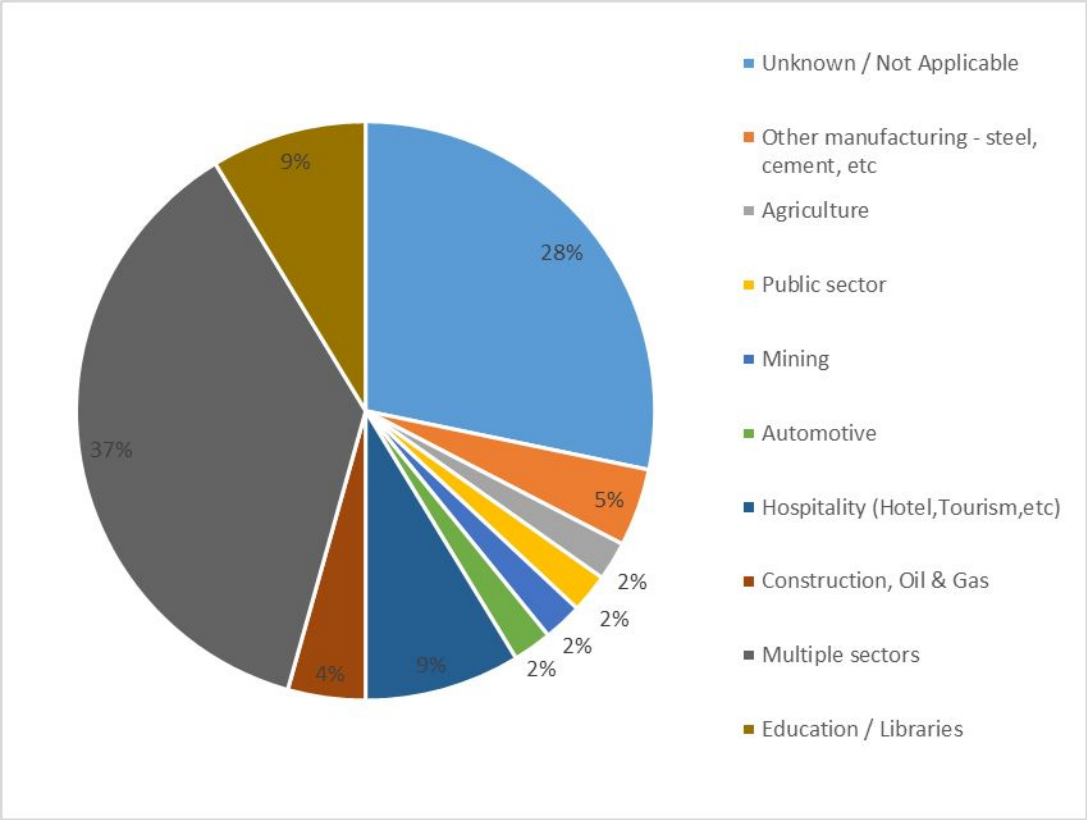

Figure 3: Sector focus of papers on decision tools

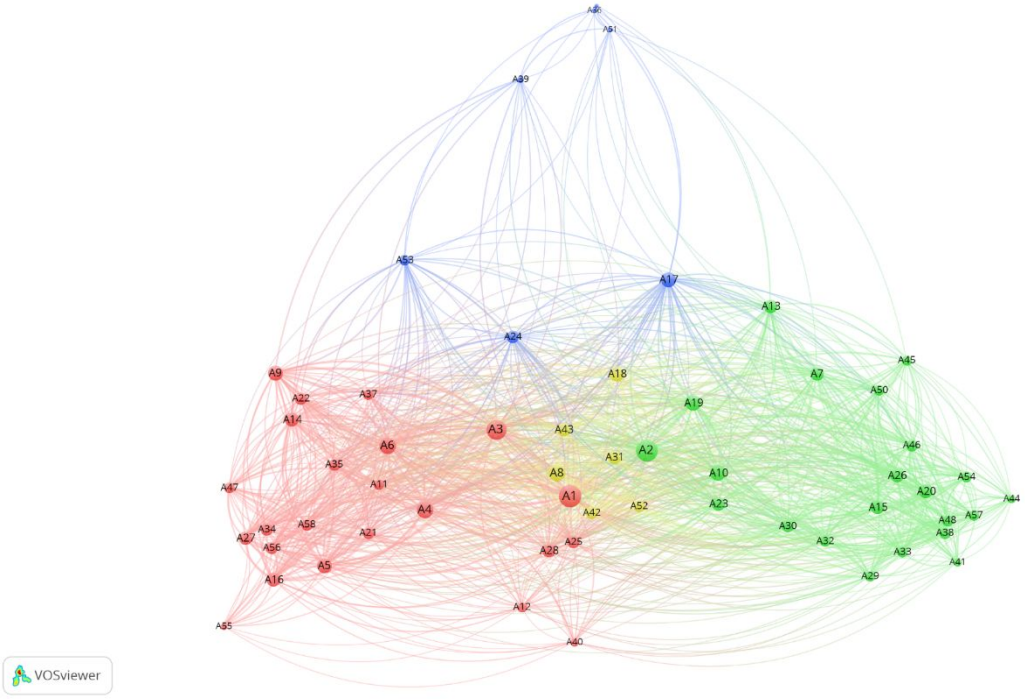

Figure 4: Co-citation network of decision tool papers

Table 1. Inclusion/exclusion criteria

	Inclusion/Exclusion Criteria	Rationale
1. Selection of journals[1]	• Only peer-reviewed English language journals; exclusion of 'grey literature' (such as books, book chapters, conference proceedings, dissertation abstracts and working papers). • Top journals satisfying specific quality criteria. • Journals whose scope fits with decision tools or that in recent years have shown an interest in decision tools or published at least one decision tool paper relevant to academics. • Journals with a practitioner slant addressing general aspects of management whose importance is widely recognised.	This decision did not affect the results of our SLR as the main contributions of seminal works on decision tools are published mainly in scientific journals included in our selection. The aim was to identify peer-reviewed journals on different topics (e.g. accounting, healthcare, manufacturing) with both a high scientific value and a research interest in decision tools. Although these journals do not satisfy the quality criteria explained in Online Resource 1, they can help to provide a more complete picture of decision tools from both the academic and practitioner point of view.
2. Selection of time range	• From 1980 to 2017 (37 years).	This interval time was considered appropriate to capture the latest decision tool research trends.
3. Selection of articles from sampled journals	• Decision tool-related articles in each journal using the keyword 'decision tools' in 'Article title, Abstract and Keywords'. • Exclusion criterion: we excluded articles that did not primarily concern decision tools or a specific decision tool, and articles where the term tool did not refer to the application/adaptation of decision tools[2].	As the field of interest is very wide and heterogeneous, we considered the term 'tools' to be a sufficiently general keyword to capture a significant portion of the articles on decision tools. While this choice could exclude some articles, such as those addressing decision tools from the operational research perspective or those focusing on single decision tools (e.g. SWOT analysis, PEST analysis), we believe it has not significantly affected the overall contribution of our SLR in providing an updated picture of the decision tool field. The 'decision tools' keyword allowed us to identify a considerable number of decision tool articles (also some using single decision tools as SWOT or PEST analysis) and capture new terminologies and concepts related to decision tools ('strategy tools' management tools) that could have been excluded by alternative keywords (e.g. tools). This choice is consistent with the boundaries of our SLR.

[1]As a result, 35 peer-reviewed journals were found.
[2]After this exclusion criterion we focused on 47 papers.

Table 2. Journals with published articles related to decision tools

Journal Title	Frequency	Percent
Strategic Change	5	10.64
Strategy & Leadership	4	8.51
Management Decision	3	6.38
Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis	2	4.26
Management Research Review	2	4.26
Procedia – Social and Behavioral Sciences	2	4.26
Academy of Strategic Management Journal	1	2.13
Administration & Society	1	2.13
Annals of Tourism Research	1	2.13
California Management Review	1	2.13
Croatian Economic Survey	1	2.13
Engineering Economics	1	2.13
Frontiers of e-Business Research	1	2.13
Harvard Business Review	1	2.13
IMP Journal	1	2.13
International Business Research	1	2.13
International Journal of Applied Engineering Research	1	2.13
International Journal of Hospitality & Tourism Administration	1	2.13
International Journal of Management	1	2.13
Journal of Business Strategy	1	2.13
Journal of Competitiveness	1	2.13
Journal of Contemporary Management	1	2.13
Journal of Economic Issues	1	2.13
Journal of Engineering, Design and Technology	1	2.13
Journal of Management Development	1	2.13
Journal of Management Inquiry	1	2.13
Journal of Management Studies	1	2.13
Long Range Planning	1	2.13
Performance Measurement and Metrics	1	2.13
Planning Review	1	2.13
Public Management Review	1	2.13
Rangelands	1	2.13
Strategic Management Journal	1	2.13
Strategic Organisation	1	2.13
Tourism Management	1	2.13
Total	47	100.00

Table 3. The most prolific authors and topics addressed

Authors	Topics
Darrell K. Rigby	Focused most of his research on surveys on the use of decisions and the general use of decision tools. • Survey of decision tools (Rigby and Bilodeau, 2005; 2007; Rigby 2001; 2003) • General use of decision tools (1993)
Paula Jarzabkowski	Focused her research on expanding knowledge about the uses and purposes of decision tools. • Strategy tools as boundary objects (Spee & Jarzabkowski, 2009) • A framework for understanding decision tools (Jarzabkowski & Kaplan, 2015) • Adoption of strategy tools (Jarzabkowski et al., 2013)

Table 4. Content analysis of recent articles on decision tools

Content Cluster	Issues Explored	Number of Articles
Conceptualising and defining decision tools	• Study the historical evolution of the decision tool concept. • Discover the main features of decision tools. • Define and conceptualise decision tools and related topics. • Help the understanding of decision tools.	14
Exploring decision tools implementation	• Find main features of the existing decision tool literature. • Illustrate general aspects of decision tool implementation. • Describe decision tool implementation. • Explore differences in decision tool implementation in different settings. • Provide models/guidelines/tools for decision tool implementation. • Investigate the impact of specific factors on decision tool implementation. • Assess the degree of decision tool implementation in both manufacturing and service sectors. • Develop models/indexes/measures to assess decision tool adoption.	25
Understanding the relationship between decision tools and other disciplines/approaches.	• Clarify and enhance the understanding of decision tools and the differences with other disciplines and approaches.	6
Discovering the outcomes of decision tools	• Analyse the effects of decision tools on technical tools and social outcomes.	2

Note: 'number' refers to the number of papers addressing each issue.

Table 5. Main gaps and supporting data drawn from the variables used in the literature analysis

Reference variable	Main gaps	Supporting data
Theoretical perspectives	Lack of use of existing consolidated theories	• Only 8% of papers were grounded in existing theories. • The most used theories were contingency theory, grounded theory, institutional theory, and personal construct theory.
Research context	Lack of studies on decision tools (especially in public sector, banking, education). Lack of model to implement and assess decision tools in the service context.	• Most of the studies were set in an unknown sector (37%), 28% in the service sector, 31% in both manufacturing and the service sector, and 4% in the manufacturing sector. • Questionnaires (46%) were the most used research method.
Research country/ies	Lack of cross-country and cross-national cultural comparison. Need for studies in less explored countries.	• 45% of studies collected data in a single country, 2% in two countries and 11% in three or more countries, while 42% did not specify or were not applicable for country categorisation. • Cross-country studies considered data from international databases without deep investigation of the national culture of each country.
Research content according to the four clusters identified	Need to clarify and conceptualise decision tools processes. Lack of studies on decision tool implementation in specific processes. Lack of studies on the relationship between decision tools and other approaches, such as environmental management, risk/safety management. Lack of studies analysing the social outcomes of decision tools and their sustainability.	• Few studies on clarifying and conceptualising decision tools processes. • Lack of studies on decision tool implementation in specific processes. • Lack of studies on the relationship between decision tools and other approaches, such as environmental management, risk/safety management. • Lack of studies that consider the social outcomes of decision tools and their sustainability.

Table 6. Main characteristics of nascent, intermediate and mature research on decision tools

Cluster colour	Category of research	Focus of nodes/articles in cluster
Red	Mature	Articles in this cluster mainly focused on: • Classification of strategic planning methods • Application of strategic planning tools • Practical use of strategy tools by SMEs and other organisations
Yellow	Intermediate	Articles in this cluster focused on: • Conceptualisation of decision tools • Importance of strategy and strategy tools
Green		Articles in this cluster also focused on: • Strategy-as-practice • Strategic planning processes • Making strategic decisions • Usage, consequences, and praxis of strategic planning
Blue	Nacent	Articles in this cluster focused on: • The antecedents of the adoption of strategic tools • Selection/rejection criteria of decision tools

Table 7. Theories recently used for publications on decision tools and their field of origin

Origin of theory	Theories (in alphabetic order) and their application in decision tool research
Organisational Sociology	• Contingency Theory
Sociology	• Grounded Theory
Sociology	• Institutional Theory
Psychology	• Personal Construct Theory

Table 8. Future directions in decision tools field and their relevance

Examples of specific future research	Academic and managerial relevance
Gap 1. Theory: To encourage future studies on decision tools based on consolidated theoretical perspectives recently adopted in the OM field or borrowed from other areas such as organisational sociology, sociology, psychology, etc.	Provide a deeper understanding of the relationship between constructs and new interpretative lenses. Provide robust and generalised frameworks and guidelines useful for managers to support decision tool transformation
Gap 2. Context: • Perform cross-case comparisons to general and country-specific models for decision tool implementation in healthcare. • Conduct exploratory case study/action research to deeply understand how decision tools could be implemented in banking, education, etc.	Fill the gap between academic literature and practical cases. Encourage decision tool implementation in high-touch sectors.
Gap 3. Countries: • Conduct cross-country studies with interdisciplinary research teams of to build models and theories for the transfer of decision tool knowledge. • Replicate successful studies in less explored countries.	Refine and expand theory in this field.
Gap 4. Issues: • Encourage studies of decision tools on individual processes. • Test existing models of decision tools and social outcomes in different settings. • Use longitudinal case studies to explore the practices needed to sustain decision tool outcomes over time.	Clarify and homogenise the concepts and terminology. Promote the adoption of decision tools in all processes, focusing on social aspects and considering safety/risks and environmental issues to achieve considerable advantages, also in the long term.