Revisiting strategy mapping for performance management: A realist synthesis

Abstract

Purpose: The strategy map represents a major contribution to the theory and practice of performance management. However, it has failed to realize its full potential due to a lack of theoretical and conceptual development. Therefore, this study aims to revisit the theories of strategy maps to better understand how and in what circumstances they benefit performance management.

Design/methodology/approach: The study employs realist synthesis, a method of systematic literature review. A theory on how strategy maps work is extracted from performance management literature, which are subsequently evaluated through a critical examination of empirical studies.

Findings: A theory of how strategy maps are meant work is presented in relation to the generic performance management stages of problem structuring, development, and use, where they can serve as a tool for discovery and by stimulating social interactions. Based on findings, 12 propositions are offered related to the effective use of strategy maps within a performance management framework.

Research limitations/implications: The introduction of the strategy map to performance management represented a breakthrough in how organizational performance could be understood and communicated. This study goes a step further by considering how they work and in what circumstances. In so doing, the study aims to open the way for new and more effective applications of strategy maps within the changing performance management context.

Practical Implications: This study provides practitioners with actionable propositions which can help in effectively using strategy maps.

Originality/value: Distinguishing the aims and mechanisms of the strategy map along performance management systems has the potential to greatly increase their effectiveness in practice as a powerful, but underutilized tool. This paper also demonstrates how realist synthesis, currently an uncommon method in management studies, facilitated the creation of a new perspective of strategy maps to fit specifically within performance management.

Keywords: performance measurement, realist synthesis, realist evaluation, performance management systems, balanced scorecard, strategy maps, strategic maps

1 Introduction

Only a few years after introducing strategy maps to performance management by incorporating them into the Balanced Scorecard, Kaplan and Norton remarked that these were "as big an insight to executives as the Balanced Scorecard itself" (2004, p. 9). It was a significant observation, given that the Balanced Scorecard became one of the most widely used frameworks used in practice (Rigby and Bilodeau, 2015). The power of the map as first introduced stemmed from its purported ability to effectively describe strategy in a cohesive and straightforward way, thereby increasing the likelihood of successful strategy implementation (Kaplan & Norton, 2001). Strategy maps could also be used in aiding in formulating strategy, in structuring problems, in defining measures and objectives, and in decision making (Kaplan and Norton, 2004; Kaplan and Norton, 2006; Lueg and Julner, 2014).

However, nearly two decades after introducing the strategy map to performance management, evidence suggests that the impact of strategy maps for performance management practice remains limited. There is evidence that few organizations use strategy maps as a part of the Balanced Scorecard or other performance management framework (Speckbacher *et al.* 2003; Tapinos *et al.* 2010), despite these being linked to effective use and satisfaction (Laitinen *et al.* 2010; Lueg & Julner, 2014). Further, strategy mapping in general often fails to be included in descriptions of the Balanced Scorecard (see Rigby, 2017), and is seldom used as a standalone tool in practice (Tapinos *et al.* 2010). In short, it appears that the strategy map and strategy mapping have not realized their potential for performance management.

There are several issues that could explain the lack of impact to date. First, descriptions of the role of strategy maps and how they are meant to work within the Balanced Scorecard framework have remained vague, often do not specify the outcome intended through their use, or apply overly generalized conceptions of performance (Hoque, 2014; Lueg, 2015; Öllinger *et al.*, 2015). Second, many scholarly works on the strategy maps remain normative (Islam, 2018), or take the limited view of the strategy map as a management control device (Tapinos *et al.* 2010). Despite a few developments (e.g., the possibility of including time delays), this narrow focus contrasts with an evolving discussion of strategy mapping and its related causal mapping *in general* in management and operations research (Hodgkinson and Clarkson, 2005), which has not entered mainstream discussions of the tool within performance management. Rather, discussions of the strategy map as it appears in performance management remain bound to the Balanced Scorecard framework, which, it should be noted, appears to be on the decline (Rigby and Bilodeau, 2017). Therefore, if the map is to reach its breakthrough potential for performance management, it is useful to consider it separately from the Balanced Scorecard.

Therefore, the aim of this paper is to revisit a major component of performance management, the strategy map, to thoroughly consider the theory of how they work, and further consider this within a unique performance management context. There are two intended contributions through this aim: First, specifying purpose and extracting theory can help practitioners better fit them to purpose and allow maps to be employed more effectively. This synthesis addresses this aim specifically by offering several propositions inferred from

the review results. Second, it aims to permit performance management research and practice to be able to adapt, adjust, and expand existing and emerging theory on maps and mapping beyond that offered in the original Balanced Scorecard framework. In other words, instead of whether strategy maps "work", the interest of this study is to develop an understanding of the generative mechanisms behind strategy maps:

RQ: How and in what circumstances do strategy maps contribute to increased organizational performance?

The objective of this paper is to address the research question through a realist synthesis (Pawson, 2006) of empirical studies on the use of strategy maps as a part of a performance management framework. A realist synthesis is a type of systematic literature review that focuses on developing a theory of how a particular tool, framework, program, or intervention is meant to work, and then examines the evidence to evaluate the strength of the theory. Because it focuses on theory rather than the tool itself, it is well-suited for evaluating complex interventions like the use of strategy maps, in which there may be multiple, conflicting factors influencing its outcomes. The idea is that by separating the theory from the tool, realist synthesis can facilitate knowledge creation and make it easier to adapt its use to a particular context.

The paper proceeds as follows: First, it explores realist synthesis and the methods of review. Next, results are presented, then discussed along with implications for research and practitioners.

2 Methodology

Most interest around the strategy map within performance management has maintained Kaplan and Norton's focus on the technical aspects of strategy maps (see Islam, 2018, for a recent review of these) to the detriment of the sensemaking processes that take place around them. Underlying this focus is a common position within performance management studies that the interpretation of performance information is straightforward, linked to positivism (Micheli & Mari, 2014). These assumptions can be problematic when considering the social aspects of performance management (Beer2018), a criticism that has been applied to strategy maps (Modell2012).

Therefore, a potentially fruitful means of understanding how maps work is to also revisit the philosophical assumptions upon which considerations of the strategy map in performance management have been built.

This article describes a realist synthesis (Pawson, 2006). In practical terms, the method begins with a guiding question: "What works for whom under what circumstances, how, and why?" (Wong *et al.*, 2013). Underlying this question is a realist philosophy of science, which will be briefly discussed in the following paragraphs as a backdrop to the synthesis method.

2.1 Why realism?

Scientific realism developed largely in response to a criticism that traditional research approaches were limited in their ability to provide explanations because they relied on artificially creating or assuming closed experimental conditions (Sayer, 1992). In most cases, experimental closure is undesirable or impossible, because reality is fundamentally open (Bhaskar, 1975). This openness quickly comes into conflict with the more commonly employed Humean view of causality which seeks to establish scientific laws by seeking events in succession (Hume, 1967).

Under this empiricist approach, reality is seen as obeying universal laws which can be uncovered through the repeated observation of events. Researchers can then *induce* the existence of these laws, which can then be tested via statistical methods to establish their validity.

However, scientific practice under the empiricist approach has been criticized because it effectively reduces reality to observable events. In social systems, this position has been cited as especially problematic because it allows for the meaningfulness of social interactions to be completely ignored or greatly reduced (Bhaskar, 1979).

As an alternative, realism adopts a generative view of causality under which cognitive, social, and physical entities interrelate to produce events via mechanisms. The primary aim of science under this perspective is to identify these mechanisms and understand their nature in order to improve practice (Bhaskar, 2014). However, disagreements exist on the meaning of the term which have complicated its application in practice (Dalkin *et al.*, 2015), and so some further clarification is needed.

First, mechanisms are described as the generally unobservable relations between processes, physical and social structures, and ideas that produce outcomes (Astbury and Leeuw, 2010; Mingers and Standing, 2017), which may operate in different contexts in which other mechanisms may be operating simultaneously. Because of the focus on how mechanisms operate in particular contexts to produce outcomes, realist evaluation often reports results in a "CMO" configuration for *context, mechanism, outcome* (Pawson, 2013). However, several researchers have pointed out continued confusion on what constitutes a mechanism and what does not (Craver, 2009; Dalkin *et al.*, 2015; Mingers and Standing, 2017). This discussion adopts the view of (Mingers, 2014), in which the mechanism explains the relation between the entities within a system that gives rise to the outcome of interest.

Before illustrating the concept of mechanism used here, it is important to note that from the realist perspective, mechanisms operate in a stratified reality (Astbury and Leeuw, 2010; Bhaskar and Danermark, 2006). There are a number of ways in which realists conceive of stratification (Bhaskar, 2010), but what is important here is the concept of emergence, *i.e.* that the properties of an entity cannot be reduced to any one of its components, but rather emerge from their interaction.

An example using a matchstick can help illustrate these concepts. At one level, the combination of its chemical composition and the friction of the surface creates a process of combustion which, given the right conditions (*e.g.* the presence of oxygen), will produce a flame. Chemical composition and combustion is the mechanism that explains the outcome of the flame but provide part, but not all of the explanation. For example, to achieve the generation of the flame matches generally cannot be lit under water. Neither will the flame be produced if the wrong technique is used: Too much pressure, and the matchstick breaks. Too little, and there will not be enough friction for the reaction to take place.

This type of analysis is open to higher-order considerations such as why the match might be struck in the first place, or the systems of production and infrastructure that could explain its existence. It also includes an interest in secondary outcomes: Light a match on an airplane, for example, and the interrelation of various social structures will likely result in the person's arrest—an emergent outcome which cannot be explained through the match's chemical properties alone and requires understanding how people make sense of the action.

2.2 Why realist synthesis?

Adopting a realist approach to discovery has several implications for how research is carried out and, importantly, how evidence is cumulated and synthesized. Critically, rejecting a view of causality based on events implies that traditional forms of systematic literature review (Tranfield *et al.*, 2003) require revisiting.

Systematic literature review originated in the field of medicine as means of consolidating existing knowledge. These reviews were meant to increase rigor over traditional, narrative reviews through transparency, inclusivity, and a focus on explanation (Denyer and Tranfield, 2009). Realist synthesis adopts many of the elements of these reviews, but requires adapting explanations into the generative view, adopting a more flexible approach to evidence gathering and to collection, and by abandoning the traditional hierarchy of evidence in evaluation. These elements and their implications will be discussed below corresponding with the stages of review, but essentially, realist syntheses involve two processes: extracting the theories of how a particular intervention works (the mechanisms) via abductive redescription or abstraction, and evaluating the strength of those theories through a critical examination of the studies uncovered through the search processes.

The following section describes the stages and methods of review, which following Pawson (2006) include identifying a topic, extracting theory, search for literature, selection and appraisal, extraction, analysis, and synthesis.

2.3 Identifying the topic of review

The interest of this discussion is in extracting the theory of strategy maps *within* a performance management context, where with few exceptions, strategy maps are discussed as a part of the Balanced Scorecard framework. Here, a scoping study revealed generally

vague descriptions of how the strategy maps were meant to work, corroborating observations of much literature on the Balanced Scorecard in general (Hoque, 2014). Therefore, it was thought that a focus on strategy maps would have the greatest potential impact for practitioners and also would benefit performance measurement theory-building.

2.4 Extracting the theory of strategy maps within a performance management framework

In a realist synthesis, how an intervention is meant to work often needs to be interpreted or adapted to fit the realist ontology. Even if some research implicitly uses a generative model of causality, few are described initially in such a way (Wynn and Williams, 2012). Others may be useful for evaluating the effectiveness of maps but focus on outcomes whose primary interest is not the direct improvement of organizational performance, *e.g.* for conflict resolution (Ackermann *et al.*, 2016).

Therefore, a scoping study served to develop an initial classification of potential mechanisms using the foundational texts of the Balanced Scorecard (*e.g.,* Kaplan and Norton, 2001, 2004, 2006), practitioner resources on the topic (Balanced Scorecard Institute, 2017), and reviews on casual maps and strategy maps (Hodgkinson and Clarkson, 2005; Lueg and Julner, 2014). Theories resulting from the scoping study were refined as the study progressed through a process of abstraction or abductive redescription—in other words, describing how the maps were meant to work in uniform terms to fit performance management.

These were grouped according to their associated performance measurement stage, whether to structure problems, develop, implement, or modify a performance management system, or for use as an analysis or communication tool. During the search process, the background section of each study included in the full-text review was evaluated to extract the theory, if present, of how the strategy map or mapping process was meant to work.

The mechanism theory, presented in Section 3, was further divided into hierarchies depending on level, such that the lowest involved largely psychological processes, and the highest considered organizational outcomes. This process and its implications will be explored in the discussion section, but centered on examining how maps could affect organizational properties via the actions of many individuals (Astbury and Leeuw, 2010).

2.5 Search Processes

Figure 1 shows an outline of the process for the synthesis. The search for studies to evaluate the propositions began with keyword searches for "performance measurement" in the academic citation databases of Scopus and Web of Knowledge, and later expanded to include "causal map" and "strategy map". The searches were intentionally broad to increase the likelihood of including relevant articles in the review. That search began with keyword searches of the Scopus and Web of Knowledge academic databases, resulting in 6583 unique articles. Additional text filters resulted in 4225 articles for title and abstract review. The

review relied heavily on the snowball approach, following Denyer *et al.* (2008), where references of each selected article were searched for relevant evidence.

[INSERT FIGURE 1]

2.6 Selection and Appraisal of Evidence

For the purposes of this review, the definition of performance measurement came from Franco-Santos *et al.* (2007), who argue that a performance measurement system exists if there are processes of measure design and selection, data capture, and information provision, features performance measures and supporting infrastructure, and has the role of measuring performance. This definition was selected because it encompasses only the necessary conditions of a performance measurement system, and would allow for a wide range of texts to be included.

Selection criteria:

- Addresses performance measurement or management in organizations
- Describes an empirical study
- Explores the consequences of the use of strategy or causal maps for either structuring problems, developing performance measures, communicating performance, or analyzing performance
- Journal is included in the Scopus Citations Index or Journal Citations Report
- Article is published between 1992 and 2017
- Results in English

Selection criteria was applied in stages. Titles and abstracts were reviewed separately to exclude only those articles that did not meet the selection criteria. Articles with the possibility of relevance were passed on for further review and were considered relevant if they could be used to evaluate the developing program theory.

Articles that met all the inclusion criteria that were published in peer-reviewed journals were included, though not all impacted the final synthesis to an equal extent. For example, though the study by Cugini *et al.* (2011) on the application of strategy maps in a university setting provided an example of a successful implementation, the study mainly focuses on describing the resulting strategically linked scorecard, offering little evidence for evaluating underlying causal mechanisms. On the other hand, studies were also evaluated if they were considered to have sufficient rigor and relevance but were not in either citation index, though only one, that of Vo, 2005, was included in this fashion.

Application of the selection criteria resulted in 52 studies which were included in the final review. Of these, more than 60% were featured in journals with a 2017 SCIMago Journal Rank in the first quartile, with over a third of the studies in 3 and 4-star journals in the 2018 ABS Academic Journal Guide, both common means of establishing quality (e.g. Franco-Santos *et al.* 2012).

2.7 Extraction

An extraction form was used to categorize the proposed mechanisms, the context, subject, intervention characteristics, and an assessment of relevance and rigor of each of the studies. As it became clear which factors were of particular interest, the extraction form was refined to include the new information, and studies which had been previously examined were examined again to consider any new information. This reflects a recognition that database protocols may need more flexibility in studies on organizations than in the context of evidence-based medicine (Tranfield *et al.*, 2003).

2.8 Analysis and Synthesis Process

Unlike traditional systematic review, the process of analysis and synthesis takes place alongside assessing relevance and extracting data. Following Pawson (2006) and Wong *et al.* (2013), full texts were reviewed and analyzed. The logical mode for this process is referred to as abstraction by Pawson (2006) and abductive redescription by Bhaskar (2016), *i.e.* describing events in a theoretically significant way. The result is an evolving "mechanism sketch" (Craver, 2006), a baseline categorization of the critical features, processes, and actors that can explain how strategy maps generate the outcomes of interest.

This baseline, and another key part of the synthesis process, comes from comparing and contrasting findings from the included studies to infer a likely explanation, so that relevant findings could be used to develop specific propositions. Though not discussed specifically by Pawson (2006), the process could be thought of as inference to the best possible explanation (Lipton, 2004). It is important to note that first, the same study may support one proposition while not another. Because the focus is on generative mechanisms, studies may also inform the evaluation of more than one proposition or mechanism. In this way, the findings of these studies were used to evaluate the mechanisms that were derived in the process of abstraction.

3 A theory of maps for performance management

Performance management refers to a wide range of processes which center on setting goals, defining performance measures, reviewing and acting upon performance data, and the activities that surround these, with the ultimate goal to improve organizational performance (Bititci *et al.*, 2018). Strategy maps have been implicated in any number of these activities,

but broadly, their use can be seen as addressing three separate but interrelated performance management stages or processes. These stages can be to structure problems, generally in the form of *strategy formation*, to select, define, modify, or develop an existing performance management component or system, or to communicate, analyze, or evaluate performance, here referred to as *use*. It should be noted that studies within performance management rarely distinguish between these different purposes, which, as will be discussed, has complicated research into strategy maps.

The following section explores how maps are seen to drive the desired positive outcomes of each stage. This theory is the result of abstraction described in the previous section, and its purpose is to provide a high-level framework that facilitates the evaluation of results. Alluding again to the match example where combustion provides a baseline explanation for how a match generates a flame, this section aims to find a baseline explanation as to how a strategy map would generate its outcomes.

A summary of the articles included in this review can be found in the Appendix which includes the citation, the methodological approach, propositions addressed, research context, the type of strategy map, its complexity, elicitation technique, and, if appropriate, the method of its development.

3.1 Strategy Mapping for Problem Structuring

Strategy maps within performance management were originally presented as a way of "describing strategy" *in order to* understand it (Kaplan and Norton, 2000). This statement highlights that mapping for structuring problems is an active process which aims to facilitate the generation of ideas, gaining a broader understanding, and ultimately pursuing a more effective strategy. Within management studies, mapping has been used to achieve a wide range of ends. Of interest to this review are the mechanisms that explain how the creation of maps work for strategy formation and execution for an individual, in groups, and finally how these can lead to the pursuit of a more effective strategy and increased organizational performance.

3.1.1 The outcome: What is a structured problem?

Broadly, when exploring outcomes for individuals these studies are concerned with gaining a deeper understanding of an issue. Understanding is discussed as task performance (Öllinger *et al.*, 2015), new knowledge or ideas (Goodier *et al.*, 2010), presenting a diverse range of concepts (Goodier and Soetanto, 2013), or complexity of maps presented (Xu, 2011).

There is also an interest in how participants perceive the strategy or strategy making process, which is often pursued in tandem. For example, mapping can be used for changing how people feel about the strategy itself, whether by allowing their views to be heard, by separating the ideas from the speaker, and from the motivational effects these can generate (Ackermann and Eden, 2011). Because of the potential, mapping is used for consensus

building and conflict resolution (Ackermann and Eden, 2005; Ackermann *et al.*, 2016; Ackermann *et al.*, 2014). Ultimately, within performance management the outcomes discussed above are meant to facilitate the pursuit of a more appropriate or effective strategy (Goodier *et al.*, 2010; Jenkins and Johnson, 1997). A full list of outcomes for structuring found in this review is included in Table 1.

3.1.2 How are maps meant to help structure problems?

Figure 2 presents the mechanisms that were found in the literature that would explain how strategy maps can generate learning, motivation, ownership, and, ultimately, the pursuit of a more effective strategy—the outcomes sought through their use as a tool for structuring problems. These outcomes correspond to three levels that have been abstracted from the literature: a psychological level whose outcomes are understanding and motivation, a group or social level where, in addition to reaching a shared, broader understanding, there can positive changes in attitude, and finally, the generation and selection of an appropriate course of action at the organizational level.

[INSERT FIGURE 2]

For the individual, maps are meant to lead to understanding by functioning as a kind of mirror, a process referred to here as *actualization*. By creating a map, the mapper makes ideas about an issue explicit, and thereby can see and reflect upon them. Eden and Ackermann (2018) refer to the map in this process as a "transitional object". The nature of the knowledge created and how actualization works has been debated extensively (see Hodgkinson and Clarkson (2005) for an overview) but remain outside the scope of this paper. What is important is that the node–link structure of causal maps specifically is a key component because it allows seeing, reflecting upon, and possibly modifying how ideas relate to one another (Eden, 1988).

Groups can achieve consensus or shared understanding, more holistic views of an issue, and have more ideas presented in several ways. First, through the actualization process, participants are able to avoid embarrassment and "save face" (Eden, 2004), participate more, and also perceive the process as fair. As a result, participation, motivation, and ownership of the strategy formation process increases. This mechanism is referred to here as *inclusion*. Second, the visual mapping process allows participants to "piggy back" (Shaw *et al.*, 2009) off one another's ideas, and so the process has a self-referential effect. This mechanism is referred to here as *reinforcement*.

The ideas generated through mapping provide multiple alternatives for action beyond those of other techniques, and so allow decision makers to choose a more appropriate course of action through the increased understanding gained through mapping. This mechanism is referred to here as *choice*.

Figure 2 also includes a number of components which condition whether and the extent to which actualization will take place. These will be considered further when evaluating the evidence but can be divided roughly into the characteristics of the mapper and their

environment, including the nature of the problem. As will be discussed, in groups and for the organization these are especially important for explaining (lack of) outcomes.

3.2 Mapping for System Development

For the current discussion, "development" refers to processes that aim to alter the state of an existing performance measurement or management system and is meant to include both implementation of a new system and adaptation of existing ones. Within performance management, there is clear interest in using maps for system development and in developing maps themselves (Bourne and Bourne, 2011; Kaplan and Norton, 2004).

3.2.1 What outcomes are sought for development?

Generally, the outcome sought during development is selecting or creating an "appropriate" measure, or more broadly, creating a more effective performance measurement system. The terms "appropriate" and "effective" are dependent on their context and take on different meanings in the studies in this review but drew on performance management literature. For example, Lucianetti (2010) investigates the use of strategy maps for translating strategy into operational goals, for adopting new performance measures, and for making cause and effect relationships between measures explicit. Drawing on (Neely *et al.*, 1995), Montemari and Nielsen (2013) seek measures that are related to specific goals, controllable, have an explicit management purpose, reflect system causality, and provide vision. Studies also seek coherence, completeness, a balance of measures (Cugini *et al.*, 2011; Parisi, 2013), or consensus as to the appropriateness of the included measures (Aranda and Arellano, 2010; Francioli and Cinquini, 2014).

3.2.2 How do maps help develop performance management systems?

Development generally discussed either as an extension of the structuring process (Aranda and Arellano, 2010; Parisi, 2013). That is, mapping is meant to assist with the selection or measures or with the attribution of value. In effect, strategy maps help answer "what do we measure?" (Montemari and Nielsen, 2013), either by *actualizing* the idea, or by providing a sufficiently broad vision of the organization, thus increasing the likelihood that appropriate measures are *chosen* to be developed and included, or that other performance management system components are adapted to align to strategy.

3.3 A theory of strategy maps for use

Within performance management, the potential for maps for communicating and effectively analysis of organizational strategy and performance has been widely discussed (Francioli and Cinquini, 2014; Kaplan, 2012; Nørreklit *et al.*, 2012). Rather than centering on the process

of mapping, this discussion begins when a map has already been formed and codified. The typical form this takes within performance management is a hierarchical map, sometimes arranged into perspectives following the Balanced Scorecard, of a limited number of performance measures (Kaplan and Norton, 2004). The following sections will consider what these reports have been used to achieve, and how they are meant to achieve it.

3.3.1 What outcomes are sought through use?

Strategy maps have primarily been discussed within the context of diagnostic and interactive use (Simons, 1995). That is, there is an interest in evaluating the extent to which the organization has been effective or efficient in its pursuit of the strategy (diagnostic), but also in evaluating the extent to which the current strategy is appropriate (interactive). The interest within performance management centers around how maps can lead to better understanding and decision making, and ultimately to increased organizational performance. For an individual evaluating a map-style report, this review is concerned with how strategy maps effectively communicate performance *relative to* other types of communication.

Operationalized, the aim of using a strategy map for evaluation can be categorized broadly as enabling improved decision making for the individual, and for the organization consensus, collaboration, and double-loop learning (Argyris, 2010). A list of outcomes of interest included in this review is included in Table 3.

3.3.2 How do maps work for use?

[INSERT FIGURE 3]

How maps are meant to bring about the outcomes described above can be separated into mechanisms explaining improved decisions making at an individual level and the organizational level. For the individual, given the way the mind works, that the node–link structure is appropriate for use, helping to reduce cognitive load and at the same time allowing the inclusion of a more representative depiction of reality (Frederiksen *et al.*, 2011). This mechanism is referred to in Figure 3 as *processing*.

There is some discussion that suggests that communicating and analyzing strategy maps facilitates understanding and empowerment, which facilitate organizational learning, consensus, and strategic alignment (Kaplan and Norton, 2004; Kaplan and Norton, 2006). Because these discussions revolve around both evaluating the extent to which a given strategy has been achieved and also evaluating the appropriateness of the strategy itself, this mechanism is referred to here and appears in Figure 3 as *evaluation*.

4 Evaluating the evidence

The previous section has outlined how strategy maps are meant to work within a performance management context. However, in explaining how a match produces flame, what is also

needed is to understand key conditioning components that would explain whether a given attempt will produce a flame or not. Therefore, the following section evaluates both the strength of the evidence for the mechanisms presented in the previous section, along with the critical conditions, elements, and components that determine whether the desired outcome is realized. 12 propositions are inferred from these observations to help researchers and practitioners better fit existing theory on strategy maps and mapping to the needs performance management.

4.1 The evidence: Strategy mapping for problem structuring

The previous section puts forth that the process of creating a strategy map works through actualization, inclusion, reinforcement, and by offering choice. The articles in Table 1 address strategy maps or mapping for problem structuring, and these provide the evidence with which the mechanisms can be evaluated, along with observations of conditioning factors.

[INSERT TABLE 1: Structuring]

First, it should be noted that research is supportive of the potential for mapping for learning purposes. Which conditions a successful use of strategy maps for structuring problems? The elements that condition successful outcomes—the firing of mechanisms, in realist synthesis terms—can be grouped into individual and group characteristics, environment, and guidance (also included in Figure 2).

4.1.1 Participant Characteristics

First, the characteristics of the person doing the mapping conditions the extent to which learning will occur. Öllinger *et al.* (2015) provide evidence supporting the idea that creating a map requires a deal of effort, which will be greater for those who lack experience. The properties of the resulting map also appear to be linked to role (Pinch *et al.*, 2010; Tegarden *et al.*, 2009), and industry (Pinch *et al.*, 2010), where, generally, greater familiarity is linked with the development of more complex maps

P1: Mapping will be less effective for learning for those with low subject-matter familiarity.

When undertaken as a group, differences in age, experience, background, resulting in unbalanced power dynamics can significantly affect the mapping process (Goodier *et al.*, 2010; Gouttenoire *et al.*, 2013; Shaw, 2004; Vo *et al.*, 2005; Xu, 2011). Langfield-Smith (1992) cites a lack of shared vocabulary as contributing to a failed group mapping attempt among members of the same profession. Importantly, feelings of psychological safety encourage mappers to present ideas, which can be encouraged through the adoption of various techniques to support *inclusion* (Ackermann and Eden, 2005; Xu, 2011). Therefore,

it appears that the greater the group diversity, differences in power, culture, or language, the more difficult it will be to synthesize ideas. These complications are important because the *type* of social interaction produced in mapping sessions is critical, with evidence of constructive conflict and inclusion of ideas as being particularly important to achieving positive group outcomes (Ackermann *et al.*, 2014; Shaw *et al.*, 2009; Van den Bossche *et al.*, 2011).

P2: Diverse groups which view an issue in different ways will have more difficulty achieving consensus.

However, several studies highlight the potential benefit of multiple possibly conflicting viewpoints (Goodier *et al.*, 2010; Gouttenoire *et al.*, 2013). Therefore, if diversity or opposing viewpoints do not result in exclusion of ideas, results can be beneficial.

P3: Diverse groups which view an issue in different ways will produce richer, more complete representations of it.

4.1.2 Guidance

It is well established that the process followed will condition successful outcomes (Ackermann *et al.*, 2016; Langfield-Smith, 1992). Despite detailed discussions of the importance of technique, only one study, that of Hodgkinson *et al.* (2004), compares two techniques directly and finds significantly greater complexity when possible combinations of ideas are presented together before they are linked. Other studies include a separate opportunity for generating ideas, either using cards or matrices (Langfield-Smith, 1992; Montemari and Nielsen, 2013), framing statements (Tegarden *et al.*, 2009), or previous interviews (Cossette, 1992). This suggests efforts to elicit ideas prior to linking them may indeed be beneficial, though research is lacking on the size and significance of comparing techniques. Finally, the questions used to elicit and link ideas are critical (Tegarden *et al.*, 2010). It should be noted that the positive learning outcomes, even at an individual level, were obtained in the presence of a highly trained researcher. A skilled facilitator with the proper technique may be capable of overcoming the barriers mentioned above, even with highly diverse, conflicting groups (Ackermann *et al.*, 2016, *e.g.*), by taking steps to encourage psychological safety, balance participation, and ask appropriate questions.

P4: Guidance results in greater learning to the extent that it helps people to understand mapping, provides a structured, fair process, and provides an opportunity for fair participation.

Further, to the extent that group outcomes are achieved through fairness and inclusion, any attempt that fails to address these in a session may not only fail to bring about consensus and group learning but may also make things worse. Langfield-Smith (1992) reports simply failing to reach consensus, but the *reinforcing* effect in groups and the efforts taken by researchers focusing on structuring in this review suggest the following:

P5: In groups that lack initial consensus and without appropriate guidance, mapping will exacerbate existing disagreements.

4.1.3 Environment

The first concern for performance management is understanding whether strategy mapping is more suitable to some problems over others. The diversity of contexts found in this review (See Appendix) suggests that the applications are wide ranging and include small and large organizations, for profit, non-profit, different levels of experience and career level, and inter-organizational contexts. This suggests that:

P6: Mapping will be useful for structuring problems regardless of organizational context or career level.

The most common means are by providing an opportunity for individuals to generate ideas prior to group mapping (Aranda and Arellano, 2010; Goodier and Soetanto, 2013; Goodier et al., 2010). Prior elicitation also can improve learning outcomes by increasing the number of ideas presented in group sessions (Goodier and Soetanto, 2013). Software-assisted mapping, sometimes in combination with individual idea generating sessions, is another means of facilitating anonymity, and can be used in real-time (Ackermann et al., 2016; Goodier and Soetanto, 2013; Niebecker et al., 2008; Shaw et al., 2009; Vo et al., 2005).

These studies highlight that the physical space in which mapping is critical to achieving positive outcomes. Here, software can be beneficial in that it allows maps to be more easily edited in real-time compared to other techniques (Ackermann *et al.*, 2016). However, other studies use physical materials and achieve similar outcomes (Goodier and Soetanto, 2013; Hodgkinson *et al.*, 2004).

P7: Environmental conditions such as physical space or software assisted mapping will condition learning outcomes.

Finally, there is the question as to whether and in what circumstance the positive outcomes of mapping translate into organizations pursuing a more appropriate strategy, a central idea for Kaplan and Norton (2004). Because no study considered this issue directly, this issue will be explored further in the discussions section.

4.2 Strategy maps for development

These paragraphs explore strategy maps for developing and implementing performance measures and performance measurement systems, a key issue in the successful application of performance management.

Studies contributing to the analysis of the role of strategy maps in development are listed in Table 2.

[INSERT TABLE 2]

When individuals develop performance measures by creating or helping to create maps, then mapping for development appears to be essentially an extension of problem structuring and works in a similar manner, with similar outcomes. That is, mapping draws attention to the most appropriate measures by effectively representing complex issues, which can then *reinforce* the idea generation process. Like structuring, researchers note success will depend on nature of the phenomenon being measured and on the characteristics of the person measuring (Craig and Moores, 2005; Montemari and Nielsen, 2013). Studies also describe similar steps to foment idea generation and participation such as anonymity, providing time for discussion and revision, and techniques to elicit ideas prior to group sessions with a facilitator (Aranda and Arellano, 2010; Cugini *et al.*, 2011; Niebecker *et al.*, 2008; Parisi, 2013).

P8: The elements of effective problem structuring can be extended to include performance management system development.

While mapping for development appears to work in a similar way to problem structuring, it must be adapted to the challenges of the development context. For example, studies describe using maps as a means for discussion and arriving at consensus prior to investing in performance reporting infrastructure (Aranda and Arellano, 2010; Francioli and Cinquini, 2014; Montemari and Nielsen, 2013), though these descriptions are limited to systems within the financial industry. However, generally studies that take into consideration the complications that arise during implementation, and the role of strategy maps within these, are lacking.

4.3 Strategy maps for use

The following paragraphs evaluate the use of strategy maps to communicate, analyze, and evaluate performance.

[INSERT TABLE 3]

Overall, there is little compelling evidence that similar results cannot be achieved through other, less costly means of communication, when the aim is communication of performance in general. However, some experimental tasks found in this study report small positive effects, and so the conditions that might bring these about will be considered. Figure 3 includes properties of the human mind and of the maps themselves as the most critical conditioning elements in the literature for explaining outcomes.

4.3.1Conditions for processing information in maps

The argument behind using maps for evaluative tasks is that these are effective at communicating complex information in a way that facilitates understanding because the human mind processes the information effectively (Strohhecker, 2016). However, results are mixed for connecting the use of strategy maps for learning, suggesting that the use of maps for evaluation and communication will be limited compared to use for structuring problems. Several studies showed a small positive correlation between use of strategy maps and learning outcomes (Banker *et al.*, 2011; Banker *et al.*, 2004; Cheng and Humphreys, 2012; Farrell *et al.*, 2012; Frederiksen *et al.*, 2011; Hu *et al.*, 2017; Humphreys *et al.*, 2016; Lowe *et al.*, 2011; Mastilak *et al.*, 2012; Tayler, 2010; Vera-Muñoz *et al.*, 2007).

Individual characteristics that were found to be influential were tolerance for ambiguity (Lowe *et al.*, 2011), education and training (Lowe *et al.*, 2011), and prior involvement in developing the strategy map (Aranda and Arellano, 2010; Tayler, 2010). The results of Carmona *et al.* (2011) draw attention to interaction effects with the reward structure, where these may amplify behavioral effects of using the maps. This highlights a danger noted in previous discussions (Tayler, 2010) that participation in a report's design can contribute to motivated reasoning.

There is an interest in connecting the properties of maps to decision making performance. Here, some evidence suggests that the link–node structure may communicate the importance of non-financial issues compared with other forms of performance reporting (Aranda and Arellano, 2010; Carmona *et al.*, 2011; Lowe *et al.*, 2011). However, two experimental studies returned insignificant results and found that participants ignored strategy map communications to some degree (Humphreys *et al.*, 2016; Rompho and Siengthai, 2012; Strohhecker, 2016). Overall, there appears to be a limit on how effective strategy maps can be during timed decision-making tasks. Several authors attribute this limit to the nature of mental models, proposing that strategy maps may help in their formation to a certain extent, after which they will likely be ignored (Frederiksen *et al.*, 2011; Humphreys *et al.*, 2016; Langley and Morecroft, 2004; Rompho and Siengthai, 2012).

P9: Strategy maps will be effective for facilitating initial communication of strategy to groups with low subject-matter knowledge, such as across functional areas.

Concerning map styles that lend themselves to analysis, there were several styles of strategy map described in these studies and these appear to influence outcomes to some degree. These can be hierarchical, display performance drivers, or cybernetic, which contain feedback loops. In addition, there is some evidence that a strategy map may be able to communicate certain types of information, such as feedback loops and time delays, which other types of communications will not (Hu *et al.*, 2017; Humphreys *et al.*, 2016; Strohhecker, 2016). As map complexity increases, satisfaction with the map appears to decrease (Vo *et al.*, 2005), in line with research on information overload and suggestions to limit the complexity in communications (Aranda and Arellano, 2010). There is some limited support that the combination of the categories of the Balanced Scorecard together with the

strategy map leads to improvement in learning outcomes (Carmona *et al.*, 2011; Lowe *et al.*, 2011).

P10: Strategy maps are effective at communicating complex information such as time delays and feedback loops, over traditional performance reports, but overly complicated reports will confuse and possibly frustrate evaluators.

4.3.2 Strategy maps in strategic evaluation

Importantly, the results discussed above come largely from experimental settings where the idea performance is unproblematic, *i.e.* operationalized and interpreted by the researcher, often operationalized as task performance. The maps themselves are generally simple—fewer than 10 nodes—conflicting with the more complex maps developed in non-experimental settings (Aranda and Arellano, 2010; Malina *et al.*, 2007) and with those created during problem structuring. Here, the evaluative mode reflects interactive use, where strategy itself can be questioned and adjusted. Given that this type of use mimics the "piggy-back" mechanism of structuring, it is likely that strategy maps would be helpful when used in this manner.

P11: Strategy maps will be effective for evaluation when used as a basis for problem structuring and interactive use.

In contrast to interactive use, diagnostic use is periodic or exceptions-based, and used primarily for control purposes (Simons, 1995; Tessier and Otley, 2012). In these cases, there is little evidence found in this review to suggest that strategy maps are well suited for this purpose. And yet, most studies on evaluation in this review focus on this type of use. The theoretical foundation of many of these, that the links represent valid causal relations, has been questioned (Norreklit, 2000), but most importantly, no study in this review reported diagnostic control outside of experimental settings in the form of evaluating the validity of links, whether causally or as means–ends relations, and two discuss significant barriers to carrying these out (Francioli and Cinquini, 2014; Malina *et al.*, 2007). Rather, these studies highlight the activity centering around the development and discussion of strategy map reports, in which the causal relations go untested. Further, some authors have suggested (Frederiksen *et al.*, 2011) that strategy maps will be most useful for evaluation if they are processed *before* they are needed for decision making. These results in combination with longitudinal studies (Aranda and Arellano, 2010; Francioli and Cinquini, 2014) suggest that maps will be ill-suited to the demands of frequent diagnostic use, especially when strategy changes frequently.

P12: Strategy maps will be effective for diagnostic use only in environments where strategic change is low, while in dynamic environments they will be overly restrictive.

5 Discussion

The results suggest that the process of creation is what lends the map its power, through its abilities as a tool for reflection, and the learning that can take place when they are created, discussed, and revised. Performance management research generally maintains a restrictive view of the strategy maps that presents maps and mapping as a relatively uncomplicated way to achieve strategic alignment and organizational performance, without sufficient consideration of the sensemaking processes around their creation and evaluation. These take place within complex processes of performance management, where the chance of failure is high. Therefore, the following session will discuss the findings to consider how what we know about strategy maps could help reduce the likelihood of failure.

5.1 Strategy maps for problem structuring

Performance measurement begins with forming an idea of what to measure and manage, and strategy mapping seems to present an ideal way to represent and learn about generally complex organizational strategies. This review concentrates on several mechanisms that might bring about this learning, and reflecting on these can guide practice and future research.

The first concerns how mapping can lead to learning for the individual, i.e. the mechanisms that take place largely within the mind when creating a series of nodes and links. Generally, this review supports the observation of Öllinger *et al.* (2015) that within the performance measurement literature theoretical discussions are underdeveloped. This synthesis suggests that the benefits can be explained through actualization, inclusion, reinforcement, and finally by offering choice.

These are worth considering within the context of performance measurement for the possible benefits of using strategy maps in combination with other elements of performance measurement. For example, the original Balanced Scorecard report and its requirement for measures to come from multiple categories appears to complement the strategy map building exercise, as the requirement to have a variety of measures from different categories can yield richer, more complete representations of strategy (Hodgkinson *et al.*, 2004). Further exploration of these synergies could result in interesting new lines of research. For example, there is little discussion of possible pitfalls of the strategy mapping process apart from one reported failure caused by disagreement (Langfield-Smith, 1992). Are there situations in which these could do more harm than good?

The discussion of elicitation, setting, and group dynamics goes well beyond the typical treatment the process of creating strategy maps receives in performance measurement literature, which often presents maps as if their creation is unproblematic. Researchers and practitioners should therefore be aware of the difficulties in creating strategy maps. Otherwise, they may result in more instead of less disagreement.

5.2 Strategy maps for system development

If development can be explained using the mechanisms of problem structuring as suggested by this synthesis, then the key gap in researching strategy maps for development are studies that consider the many potential sources of failure within the development process, such as those enumerated by (Van Camp and Braet, 2016). For example, the development process is complex, often includes multiple actors, can take years (Craig and Moores, 2005; Franco-Santos and Bourne, 2003), and may be the most likely stage of failure (Neely *et al.*, 2000). Generally, evidence was supportive of the potential of a strategy map to promote successful development outcomes, but there were few descriptions of the process (Aranda and Arellano (2010) and Francioli and Cinquini (2014) are notable exceptions), whether that was using strategy maps to develop performance measures for use, developing strategy map-style communications, or both.

The evidence in this review suggests that when strategy maps are used as a continuation of the strategic dialog begun during problem structuring, then it is more likely to result in better performance measurement systems. Reviewed texts were generally favorable the effects of participation in development, which coincide with other studies in performance measurement on "buy-in" created through participation in development (Groen *et al.*, 2012). Participation in development holds the risk of leading to biases (Tayler, 2010). In theory, at least, using the strategy map as a tool for fomenting debate could prevent these biases from unbalancing the measurement system. But researchers and practitioners should be aware that if the benefits of mapping are explained in large part through inclusion, and that this is brought out in part to the extent that the mapping process is seen as fair, then care is needed in how the ideas are implemented so as not to bring about dysfunctional effects (Franco-Santos and Otley, 2018).

Therefore, there is an interesting opportunity for studies that observe strategy maps in the processes of development and implementation specifically to learn more about how they can or cannot help navigate the complex development process, especially for aligning the various elements of performance management systems to organizational strategy.

5.3 Strategy maps for use

Two mechanisms are presented to explain how strategy maps can lead to better decision making and organizational performance. For individuals communicating or analyzing maps, the power of the map has been described as resting in its ability to show causal relations and relevant information and so facilitate processing.

The results of this review suggest that more research building on links to cognitive psychology in the line of Dilla and Steinbart (2005) and Cheng and Humphreys (2012) could help develop a theory of when strategy maps will be *most effective* for communication and evaluation, especially when used diagnostically. As it stands, both the theoretical explanation and studies demonstrating a map's practical adequacy are lacking.

More importantly, this review highlights that experimental studies with tightly defined notions of performance and short time limits are a poor reflection of how maps are used for communication in organizations, though admittedly this could be due to selection bias or limitations of the review. Nevertheless, studies focusing on decision-making contrast with descriptions in the field (Aranda and Arellano, 2010; Francioli and Cinquini, 2014), where the strategy map serves as tool for ongoing discussion over long periods of time, and in which manger-participants had the opportunity to analyze, question, and importantly to refine the strategy maps presented to them. It appears again that the strength of maps is not primarily in their ability to communicate, but rather in their suitability for structuring problems and developing a balanced, complete measurement system. In this way, they do appear to serve as a medium for achieving "double-loop" learning and can result in the kind of transformative outcomes described in (Kaplan and Norton, 2004), subject to the constraints and difficulties described for the previous stages.

6 Conclusions

Two decades after its introduction to the field, the strategy map has the potential to represent a major contribution to contemporary performance management. This review suggests that separating the strategy map from the Balanced Scorecard could help it realize its potential as a breakthrough theory within performance management. Doing so allows the identification of mechanisms that explain how strategy mapping can facilitate strategy formation, performance measurement system development, and strategy evaluation and communication, which can further lead to the development of more effective applications of the concept.

Realizing the potential of the strategy map will require addressing a mismatch between research focus to date and organizational reality. To fully utilize strategy maps within performance management, researchers will need to better understand how these feature with other performance management components. Doing so will require shifting focus from evaluative tasks for diagnostic use—representing the majority of research on evaluation—to observing how these function in organizations and how they can support the overall strategic dialog. Experimental research is helpful for better understanding the behavioral effects of these maps, and yet they often neglect the difficulty in developing and implementing them for use in organizations, generally operating in conditions of frequent strategic change (Porporato *et al.*, 2017).Therefore, a major contribution of this review is to highlight the importance of differentiating these processes in order to analyze how maps work in organizations.

The second contribution of this review is that it begins to separate the theory of strategy maps from any particular tool or framework, which in performance management is generally the Balanced Scorecard. Through the realist synthesis process, the review offers a "mechanism sketch" (Craver, 2006), a baseline categorization of the critical features, processes, and actors that can explain how strategy maps generate the outcomes of interest. Given the realist assumption of openness, the exact way that these features interrelate will vary from situation to situation, but the mechanism should remain constant.

Further, 12 propositions are offered on how strategy maps will work, for which purpose, and in what circumstances. Future research within performance management can build upon these to develop a unique theory of maps that is specific to and useful for the field. More research is needed to understand, for example, how the use of strategy maps for evaluation might lead to unintended, potentially negative impacts when they are combined with existing incentive structures (Cheng and Coyte, 2014; Mastilak *et al.*, 2012), but there is also a need to explore interactions with target setting, defining KPIs, information flows, and other performance management components. Doing so opens the possibility of discovering new applications of strategy maps and mapping within performance management.

Separating the theory from the tool is also important because it can help explain and address failures at different levels. Distinguishing level could help explain why, for example, strategy maps could effectively improve communications across groups, but lead to poor decision making in an individual evaluative task. The view offered here is that understanding the two requires a consideration of largely different levels, one primarily cognitive, the other situated in and conditioned by organizational-level elements. Perhaps most importantly, a focus on *how* can help the strategy map establish its own place within performance management study, and to evolve in the rapidly changing organizational context (Bititci *et al.*, 2012).

The review represents one of very few realist syntheses in management studies, though recent calls for more reviews of this type highlight their perceived potential (Jones and Gatrell, 2014). By focusing on the underlying theory of how strategy maps are meant to work, these types of reviews open new lines of questioning that could be of interest to performance measurement and management.

Although the findings are encouraging, the review is limited in several ways. Perhaps most importantly, by taking a broad view of strategy maps across three stages of performance management, nuance has been sacrificed in the analysis of each. While maintaining sufficient breadth is useful for considering strategy maps within performance management at a high level, future studies will be needed to better establish particular configurations of elements that generate outcomes. This is not a call for lists in the form of context, mechanism, outcome, but rather for continued focus on building nuanced explanations of strategy maps.

The findings of this paper are important for practitioners using or considering adopting the use of strategy maps. First, it highlights that creating strategy maps is a highly accessible activity for achieving shared understanding of what organizations do and how they do it, even among diverse groups of stakeholders. What is significant, and distinct from recent reviews (e.g. Islam 2018), is that the process of creation is what drives much of the benefits to be had from the strategy map, and further one that likely requires significantly less investment than many elements of the performance management system. For example, simply attempting to create a strategy map as a group can be a useful exercise that can generate consensus. These benefits can be carried over to develop or implement appropriate performance measures, where they serve as a focus point for discussion to link measures to strategy. Conversely, practitioners should proceed with caution before investing in strategy map-style reports for communicating performance for diagnostic use. Not only are there multiple challenges to

developing such reports, but they may have unintended effects on behavior or simply be ignored.

The original purpose of the strategy map was to describe strategy at a time when intangible assets were being recognized as central to gaining sustainable competitive advantage. In the current global context, characterized by an increasing rate of change, the introduction of disruptive technology, and societal shifts, organizations that effectively address complexity will have an advantage over those which cannot (Kelly, 2015). This review suggests that the strategy map is particularly well-suited to addressing this need because of its ability to support consensus-building and learning, and therefore could support critical performance management aims in ways that have to date not been fully explored. By considering the theory of how strategy maps work and in what circumstances, both researchers and practitioners alike can move towards realizing the full potential of strategy maps in performance management.

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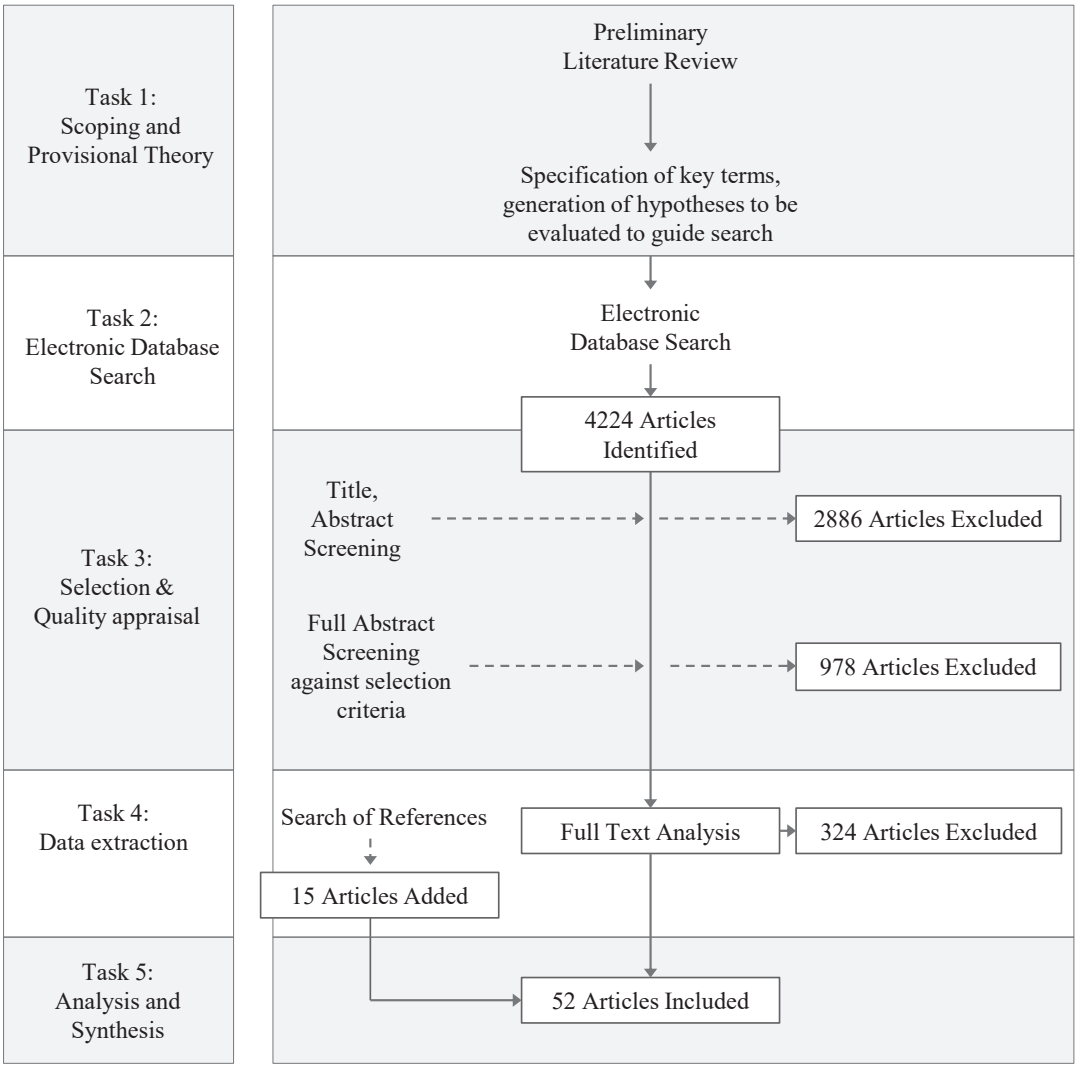
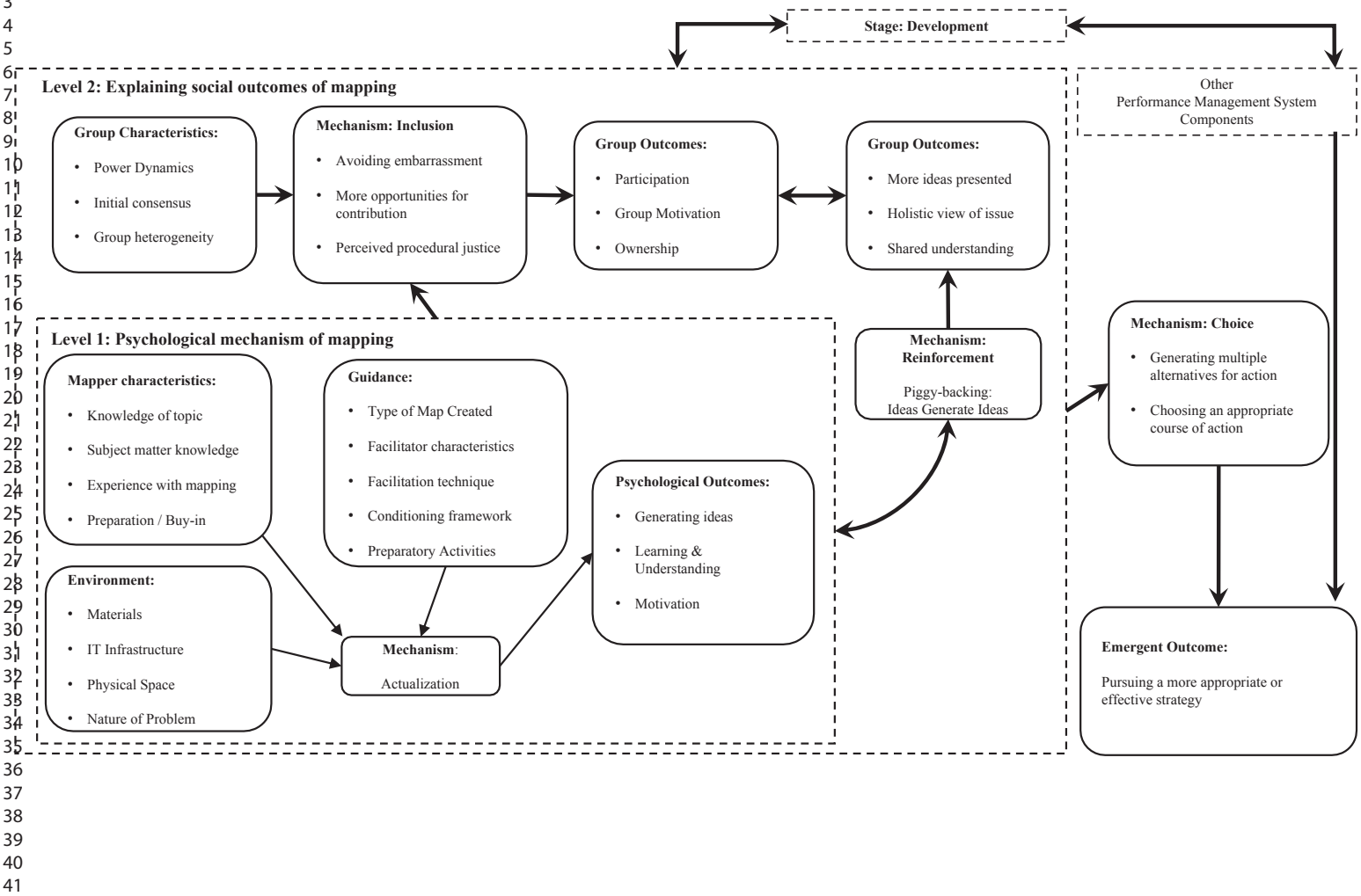
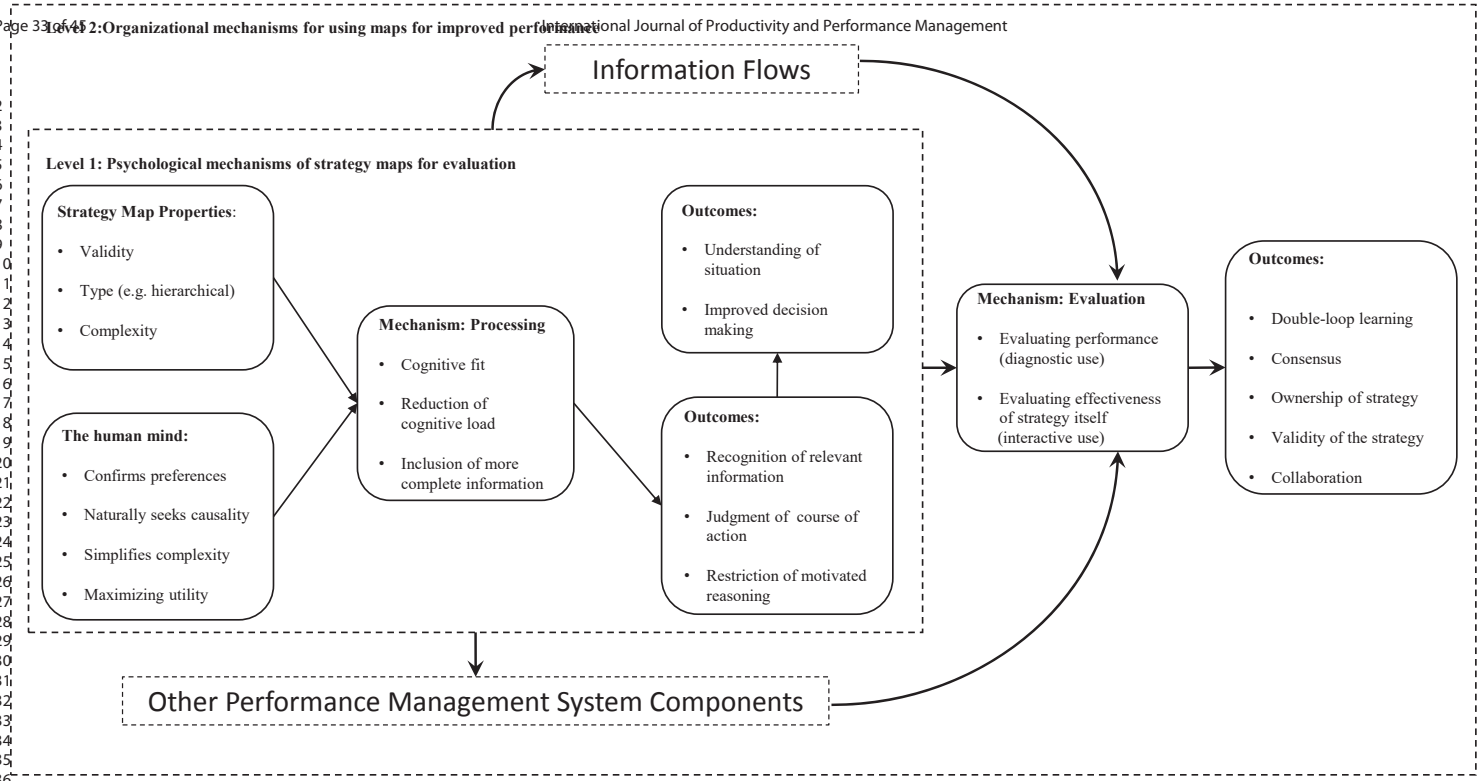

Task 1: Scoping and Provisional Theory
Preliminary Literature Review
Specification of key terms, generation of hypotheses to be evaluated to guide search
Task 2: Electronic Database Search
Electronic Database Search
4224 Articles Identified
Task 3: Selection & Quality appraisal
Title, Abstract Screening
2886 Articles Excluded
Full Abstract Screening against selection criteria
978 Articles Excluded
Task 4: Data extraction
Search of References
15 Articles Added
Full Text Analysis
324 Articles Excluded
Task 5: Analysis and Synthesis
52 Articles Included


Stage: Development
Level 2: Explaining social outcomes of mapping
Group Characteristics:
• Power Dynamics
• Initial consensus
• Group heterogeneity
Mechanism: Inclusion
• Avoiding embarrassment
• More opportunities for contribution
• Perceived procedural justice
Group Outcomes:
• Participation
• Group Motivation
• Ownership
Group Outcomes:
• More ideas presented
• Holistic view of issue
• Shared understanding
Other Performance Management System Components
Level 1: Psychological mechanism of mapping
Mapper characteristics:
• Knowledge of topic
• Subject matter knowledge
• Experience with mapping
• Preparation / Buy-in
Guidance:
• Type of Map Created
• Facilitator characteristics
• Facilitation technique
• Conditioning framework
• Preparatory Activities
Environment:
• Materials
• IT Infrastructure
• Physical Space
• Nature of Problem
Mechanism: Actualization
Psychological Outcomes:
• Generating ideas
• Learning & Understanding
• Motivation
Mechanism: Reinforcement
Piggy-backing: Ideas Generate Ideas
Mechanism: Choice
• Generating multiple alternatives for action
• Choosing an appropriate course of action
Emergent Outcome:
Pursuing a more appropriate or effective strategy


Level 2:Organizational mechanisms for using maps for improved performance
Information Flows
Level 1: Psychological mechanisms of strategy maps for evaluation
Strategy Map Properties:
Validity
Type (e.g. hierarchical)
Complexity
The human mind:
Confirms preferences
Naturally seeks causality
Simplifies complexity
Maximizing utility
Mechanism: Processing
Cognitive fit
Reduction of cognitive load
Inclusion of more complete information
Outcomes:
Understanding of situation
Improved decision making
Outcomes:
Recognition of relevant information
Judgment of course of action
Restriction of motivated reasoning
Mechanism: Evaluation
Evaluating performance (diagnostic use)
Evaluating effectiveness of strategy itself (interactive use)
Outcomes:
Double-loop learning
Consensus
Ownership of strategy
Validity of the strategy
Collaboration
Other Performance Management System Components

Source	Summary of Findings	Task Setting
Öllinger *et al.* 2015	Causal mapping in structuration → improved decision making during subsequent task(NS), E	Individual
Montemari & Nielson, 2013	Aiding in the process of creating a causal map → increased understanding of intangible assets (+), C	
González *et al.* 2012	Described elicication using 'repertory grid technique' → goal clarity, understanding of organizational goals (+), C	
Aranda & Arellano, 2010	Elicitating a causal map → Understanding of strategy (+), E	
Tegarden *et al.* 2010	Anonymity during individual map creation → range of concepts presented, understanding of how to achieve goals(+), P	
Pinch *et al.* 2010	Freehand mapping process → revealing issues about which mappers are not aware (NS) Freehand mapping process → understanding of organizational and social context of design thinking (+), P	
Tegarden & Sheets, 2009	Mapping with framing statements and anonymity → Ease of arriving at a shared vocabulary, understanding of strategy (+), C	
Kunc, 2008	Application of Systems Thinking to develop strategy maps → Mental Model Accuracy (+), E	
Vo, 2005	Involvement in mapping session → Subjective Assessment of the map for evaluation of performance (+)*, E	
Hodgkinson *et al.* 2004	Pairwise elicitation technique for map creation → map complexity (+), perceived effort (NS) Freehand elicitation technique for map creation → map complexity (+), perceived effort (NS), E	
Jenkins & Johnson, 1997	Complexity of elicited map → firm performance (+), C	
Cossette & Audet, 1992	Elicitation using indirect and direct tecniques → Learning outcomes of mapping (+), C	
Langfield-Smith, 1992	Elicitation using separate questioning, card sorting, and feedback interviews → Success in creating map (+), P	
Ackermann & Alexander, 2016	Use of mapping in conjunction with Group Support Software → Conflict Resolution (+), C	In Group
Ackermann *et al.* 2014	Use of Mapping with Group Support System → understanding (+), holistic view of the problem (+), P	
Francioli & Cinquini, 2014	Process of creating, reviewing, and discussing strategic linkages → successful development and use (+), C	

Parisi, 2013	Using more than one elicitation technique for mapping → avoidance of confirmatory bias (+), elicitation of tacit knowledge, favorable development outcome(+), A
Montemari & Nielson, 2013	Aiding in the process of creating a causal map → actor's increased understanding of complex network (+), C
Goodier & Soetanto, 2013	Handdrawn Mapping followed by Group Support System software for map creation → Understanding of issues relevant to the mapping session (+), inclusion of viewpoints (+), P
Gouttenoire *et al.* 2013	Causal Mapping Process with Group Support System and effective facilitation → self-reflection, understanding of issues, and interest of participants (+), P
González et al. 2012	Individual mapping sessions followed by group comparison → Aligning managers' perceptions of organizational strategy (+), C
Cugini *et al.* 2011	Collaborative approach to elicitation → successful development of a strategy map (+), E
Van den Bossche *et al.* 2011	Having a shared mental model → group task performance (+), E
Xu, 2011	Social interaction → resulting map complexity (+) Feelings of psychological safety → resulting map complexity (+) Moderating effect of gender (NS), E
Aranda & Arellano, 2010	Creating a Strategic Map as a group → Mutual Understanding within a management team (+), E
Goodier *et al.* 2010	Elicitation through future scenario building → Group Think during group mapping (-), engaging participants, understanding of relevant issues and implications of decisions, P
Tegarden *et al.* 2010	Previous individual, anonymous mapping session → bringing underlying issues to the surface (+), P
Lucianetti, 2010	Using a strategy map → Increasing participation of top management in strategy formation (+), S
Shaw *et al.* 2009	JOURNEY mapping process with anonymity → broader understanding, inclusion, and synthesis of ideas (+), P
Niebecker *et al.* 2008	Use of impact matrix for creation of strategy map → successful building of map (+)*, P
Vo, 2005	Aggregation technique for creating strategy maps → Map Complexity (+), E
Ackermann & Eden, 2005	Anonymous, software supported mapping process → defensiveness (-), learning (+), inclusion of ideas (+), P
Craig & Moores, 2005	Discusses special difficulties for family firms in initial structuring with strategy maps and uses a scale (F-PEC) to address this difficulty, C
Shaw, 2004	Software supported causal mapping → creating and sharing new ideas (+), understanding of issues (+), P
Cossette, 1992	Elicitation using indirect and direct tecniques → Organizational performance through individual action (+), C

Langfield-Smith, 1992	Describes a mapping session in which participants were unable to create a shared map. Cites power dynamics, lack of shared experiences, and design in the mapping process as possible contributing factors, P

Notes: '+' signifies a positive relation; '-', a negative relation; '*': partially supported; NS: Non-significant results. Methods: C: Case Study, P: Participatory Workshop(s), E: Experimental Design, S: Survey, A: Action Research
Source: The Author

Source		Task Setting
Montemari & Nielson, 2013	Development process using previously developed causal map → identification of appropriate measures (+), C	Individual
Tayler, 2010	Involvement in measurement selection → motivated reasoning (+) Involvement in measurement selection + evaluation with BSC-style strategy map → motivated reasoning (-) , E	
Francioli & Cinquini, 2014	Development using informal strategy maps with finality relations between measures → avoiding tensions, costs associated with attempting to validate causal links, successful development and use of resulting Balanced Scorecard report (+), C	In Group
Parisi, 2013	Use of hybrid map development technique and strategic map → selection of the most important, appropriate measures (+), A	
Montemari & Nielson, 2013	Development process using previously developed causal map → identification and implementation of measures that are related to specific goals, controllable, have an explicit purpose, reflect system causality, and provide vision (+), C	
Cugini *et al.* 2011	Collaborative approach to development → Developing a more accurate and complete strategy map (+), E	
Aranda & Arellano, 2010	Communicating Strategic Links during development → Consensus between top and middle management, E	
Lucianetti, 2010	Use of strategy map → Translating strategy into operational goals (+) Adopting new performance measures (+) Explicating cause--effect relationships (+), S	
Niebecker *et al.* 2008	Use of impact matrix → increased transparency across working groups, identifying relevant performance measures (+)*, P	
Craig & Moores, 2005	Notes difficulty in development varies depending on its category (internal, customer, financial, or learning), C	

Notes: '+' signifies a positive relationship; '-', a negative relationship; '*': partially supported; NS: Non-significant results. Methods: C: Case Study, P: Participatory Workshop(s), E: Experimental Design, S: Survey, A: Action Research

Source: The Author

Source	Principal Findings	Map Type	Map Complexity (Nodes)	Task Setting
Handoko & Wehartaty, 2017	Performance information communicated via strategy map → reduced motivated reasoning (+)*, E	Hierarchical	< 10	Individual
Hu *et al.* 2017	Use of map for communicating performance, compared to traditional report → understanding of the performance information(+)*, E	Hierarchical	< 10	
Strohhecker, 2016	Use of strategy map to analyze performance → decision making performance (+) NS, E	Hierarchical	< 25	
Humphreys *et al.* 2016	Inclusion of time delays with strategy map feedback → improved decision-making*, E	Hierarchical	< 25	
Cheng & Coyte, 2014	Results communicated with strategy map → Propensity for Knowledge Sharing and Extra-role behaviors (+)* (only with subjective incentive scheme), E	Hierarchical	< 10	
Cheng & Humphreys, 2012	Information presented in strategy map → decision making (+), E	Hierarchical	< 10	
Rompho, 2012	Information presented in strategy map → decision making (+) NS, E	Hierarchical	< 25	
Farrell *et al.* 2012	Narrative links → improved decision making (+), E	Narrative links	< 10	
Mastilak *et al.* 2012	Use of a strategy map → Perception of controllability of results (+), E	Hierarchical	< 10	
Booker *et al.* 2011	Presentation of narrative information → perception of predictive capacity of measure (+), E	Narrative links	N/A	
Banker *et al.* 2011	Information presented in strategy map → decision making (+), E	Hierarchical	< 10	
Frederiksen *et al.* 2011	Use of map prior to simulation task → task performance (+)* Use of map during simulation task → task performance (-)*, E	Cybernetic Strategy	< 25	
Lowe *et al.* 2011	Use of integrated map as decision aid → focus on financial performance (-)* Use of compensatory map as decision aid → focus on financial performance (-)* Moderated by tolerance for ambiguity (effect of integrated map +) , financial background (effect of integrated map (+)), E	Hierarchical	< 10	
Carmona *et al.* 2011	Pyramid map type (vs. silo) → emphasis on financial results (-), moderated by reward structure (NS) and National culture (NS), E	Hierarchical	< 10	
Humphreys & Trotman, 2011	Use of maps for communication of performance results → Reduced common measures bias (when all measures are strategically linked) (+), E	Hierarchical	< 10	
Tayler 2010	Information presented in strategy map → motivated reasoning (-)*, E	Hierarchical	< 10	
Laitinen *et al.* 2010	Perceived causality of between measures → Satisfaction with Performance Measurement System (NS), S	N/A	N/A	
Vera-Munoz *et al.* 2007	Communication of performance with strategy map → decision making (+), E	Hierarchical	< 10	
Wong-on-Wing *et al.* 2007	Use of maps for communication and analysis → Reduced bias in evaluating performance (+), E	Hierarchical	< 10	

Dilla & Steinbart, 2005	Communication of tabular displays or graphs → improved decision making, consensus, and consistency (all NS), E	N/A	N/A	
Vo, 2005	Map Complexity → Satisfaction (-), E	Hierarchical + Cybernetic	< 25	
Banker *et al.* 2004	Communication of performance with strategy map → decision making (+), E	Hierarchical	< 10	
Langley & Morecroft, 2004	Strategic Map Decision Aid → long-term learning (NS), E	Hierarchical	< 10	
Francioli & Cinquini, 2014	Use of BSC strategy map → strategy execution, communication (+), C	Hierarchical	< 25	In Group
Lucianetti, 2010	Use of strategy map for performance analysis → Improving internal communication among people (NS) Aligning action with strategy (+) Building consensus around the organization's vision and strategy (+) Enhancing time and efforts on strategic related issue (+) Making strategy everyone's day job (+), S	N/A	N/A	
Aranda & Arellano, 2010	Communicating strategy through a map, with time for discussion of content and relevance with peers → Consensus about strategy (+), Effect more pronounced for non-financial performance E	Hierarchical	< 25	
Malina *et al.* 2007	Validity of Causal Relations → Improved Decision Making (NS), C	Hierarchical	< 10	

Notes: '+' signifies a positive correlation; '-', a negative correlation; '*': partially supported; NS: Non-significant results. Methods: C: Case Study, P: Participatory Workshop(s), E: Experimental Design, S: Survey, A: Action Research. Only variables related to strategy maps are included in this table.
Source: The Author

Appendix Table: Summary of selected studies

Author(s)	Year	Journal	Methodology	Stage	Participants	Map Complexity**
Handoko & Wehartaty, 2017	2017	Polish Journal of Management Studies	Experimental	USE	Students	Basic
Hu *et al.* 2017	2017	European Journal of Operational Research	Experimental	USE	MBA Students	Mid
Ackermann & Alexander	2016	Group Decision and Negotiation	Case Study	STR	Organizations in negotiation	Mid
Humphreys *et al.*	2016	The Accounting Review	Experimental	USE	Graduate Students	Basic
Strohhecker	2016	Journal of Management Control	Experimental	USE	Students	Mid
Öllinger *et al.*	2015	Educational Technology Research and Development	Experimental	STR	Undergraduate Students	Varied
Ackermann *et al.*	2014	European Journal of Operational Research	Participatory Workshop(s)	STR	Senior Managers	Mid
Cheng & Coyte	2014	Management Accounting Research	Experimental	USE	Graduate Students	Basic
Francioli & Cinquini	2014	Journal of Accounting and Organizational Change	Case Study	STR, DEV, USE	Managers	Mid
Goodier & Soetanto	2013	Journal of Maps	Participatory Workshop(s)	STR	UK Construction Industry Experts	Mid
Gouttenoire *et al.*	2013	Agronomy for Sustainable Development	Participatory Workshop(s)	STR	Organic Farmers	Complex
Montemari & Nielson	2013	Journal of Intellectual Capital	Case Study	STR, DEV	Network of organizations in the same value chain	Mid
Parisi	2013	Studies in Managerial and Financial Accounting	Action Research	STR, DEV	Pharmaceutical Company	Complex
Cheng & Humphreys	2012	The Accounting Review	Experimental	USE	Graduate Students	Basic
Farrell *et al.*	2012	Journal of Management Accounting Research	Experimental	USE	Undergraduate Business Students	Basic
González *et al.*	2012	Total Quality Management & Business Excellence	Case Study	STR	Business Executives	Mid

Mastilak *et al.*	2012	Journal of Management Control	Experimental	USE	MBA Students	Basic
Rompho	2012	Measuring Business Excellence	Experimental	USE	MBA Students	Mid
Banker *et al.*	2011	International Journal of Accounting Information Systems	Experimental	USE	Graduate Management Students	Basic
Booker *et al.*	2011	Advances in Accounting	Experimental	USE	Graduate Management Students	Mid
Carmona *et al.*	2011	Advances in Accounting	Experimental	USE	Executive MBA Students	Basic
Cugini *et al.*	2011	Public Money and Management	Experimental	STR, DEV	University department	Mid
Frederiksen *et al.*	2011	Learning and Instruction	Experimental	USE	Undergraduate Students	Mid
Humphreys & Trotman	2011	Journal of Management Accounting Research	Experimental	USE	MBA Students	Basic
Lowe *et al.*	2011	Accounting and Business Research	Experimental	USE	Executive MBA Students	Basic
Van den Bossche *et al.*	2011	Instructional Science	Experimental	STR	Undergraduate Students	Mid
Xu	2011	Gender in Management	Experimental	STR	Undergraduate Business Students	Unknown
Aranda & Arellano	2010	Journal of Management Accounting Research	Experimental	STR, DEV	Savings Bank Employees	Mid
Goodier *et al.*	2010	Futures	Experimental	STR	Practitioners, various	Mid
Laitinen	2010	International Journal of Accounting, Auditing and Performance Evaluation	Survey	USE	CEOs	Mid
Lucianetti	2010	International Journal of Business Performance Management	Survey	STR, DEV, USE	Managers	Unknown
Pinch *et al.*	2010	Geoforum	Participatory Workshop(s)	STR	Design Organizations	Mid
Tayler	2010	The Accounting Review	Experimental	DEV, USE	MBA Students	Basic
Tegarden *et al.*	2010	Accounting Education	Participatory Workshop(s)	STR	Academics	Mid

Shaw *et al.*	2009	International Journal of Management and Decision Making	Participatory Workshop(s)	STR	Managers	Mid
Tegarden & Sheets	2009	Group Decision and Negotiation	Case Study	STR	Executives	Mid
Kunc	2008	Management Decision	Experimental	STR	Students	Mid
Niebecker *et al.*	2008	International Journal of Managing Projects in Business	Participatory Workshop(s)	STR, DEV	Managers	Mid
Malina *et al.*	2007	Contemporary Accounting Research	Case Study	USE	Fortune 500 Company	Basic
Vera-Munoz *et al.*	2007	Contemporary Accounting Research	Experimental	USE	Public Accountants	Basic
Wong-on-Wing et al.	2007	Accounting, Organizations and Society	Experimental	USE	MBA Students	Basic
Ackermann & Eden	2005	Group Decision and Negotiation	Participatory Workshop(s)	STR	Managers	Mid
Craig & Moores	2005	Family Business Review	Case Study	STR	Managers	Mid
Dilla & Steinbart	2005	International Journal of Accounting Information Systems	Experimental	USE	Students	Mid
Vo *et al.*	2005	Causal Mapping for Research in Information and Technology	Experimental	STR, USE	Practitioners, various	Mid
Banker *et al.*	2004	The Accounting Review	Experimental	USE	MBA Students	Basic
Hodgkinson *et al.*	2004	Organizational Research Methods	Experimental	STR	MBA Students	Mid
Langley & Morecroft	2004	European Journal of Operational Research	Experimental	USE	MBA Students	Basic
Shaw	2004	International Journal of Innovation and Learning	Participatory Workshop(s)	STR	Managers	Mid
Jenkins & Johnson	1997	British Journal of Management	Case Study	STR	Business Owners	Mid
Cossette & Audet	1992	Journal of Management Studies	Case Study	STR	Owner / Manager	Mid
Langfield-Smith	1992	Journal of Management Studies	Participatory Workshop(s)	STR	Firefighters	Mid

Source: The author

*STR: Problem structuring, DEV: Performance management system development, USE: use for communication, analysis, and evaluation

**Complexity is judged by the number of nodes: Basic: =< 10 Nodes, Mid: Between 10 and 25 Nodes; Complex: > 25 Nodes

Map Type	Development Method	Elicitation Technique
Hierarchical		
Hierarchical		
Hierarchical	Workshop	Direct
Hierarchical		Indirect
Hierarchical		
Hierarchical		Direct
Cybernetic	Workshop	Direct
Hierarchical		Indirect
Hierarchical		Direct
Hierarchical	Workshop	Direct
Cybernetic	Workshop	Direct
Cybernetic	Workshop	Indirect
Cybernetic	Aggregate + Congregate	Indirect
Hierarchical		Indirect
Narrative links		Indirect
Hierarchical	Aggregate	Hybrid

Hierarchical		Indirect
Hierarchical		Indirect
Hierarchical		Indirect
Narrative links		Indirect
Hierarchical		Indirect
Hierarchical	Aggregate	Hybrid
Cybernetic		Indirect
Hierarchical		
Hierarchical		Indirect
Hierarchical		Indirect
Unknown		Direct
Hierarchical		Direct
Hierarchical	Hybrid	Hybrid
N/A		N/A
Unknown		Unknown
Hierarchical	Workshop	Direct
Hierarchical		Indirect
Cybernetic	Workshop	Direct

Hierarchical	Workshop	Direct
Hierarchical		Hybrid
Cybernetic	Congregate	Direct
Hierarchical	Workshop	Direct
Hierarchical		Indirect
Hierarchical		Indirect
Hierarchical		
Hierarchical	Workshop	Hybrid
Hierarchical	Aggregate	Direct
N/A		N/A
Hierarchical + Cybernetic	Aggregate, Congregate, and Workshop	Hybrid
Hierarchical		Indirect
Hierarchical		Hybrid
Hierarchical		Indirect
Hierarchical	Workshop	Direct
Hierarchical		Indirect
Cybernetic		Hybrid
Hierarchical		Direct