

Tensions at the intersection of management control and innovation: a literature review

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Abstract This paper reviews 47 articles dealing with tensions at the intersection of management control and innovation. One purpose is to present the status of the research in the area in terms of types of articles, research methods, theoretical approaches, and tension-related terms used. A second purpose is to conceptually compare the use and interpretations of tension in the reviewed articles, as well as to systematically map and categorize highlighted competing demands. A third purpose is to suggest a tension-based framework. Among other characteristics and trends, the paper indicates an increased research interest in the issue of tensions during the review period (1991–2015). Although different theoretical approaches are adopted, the contingency approach is the most common. Furthermore, the review shows that several tension-related terms are used either alone or in parallel in the articles, often interchangeably and without clarifying their definitions. The tension-based framework presents four different types of tension: (1) inherent innovation-control tensions, (2) inherent management control tensions, (3) created management control tensions, and (4) decision-making tensions in innovation practices. The framework also suggests interpretations of and responses to tensions related to management control and innovation. Theoretically, the framework can enable a more precise debate that builds on previous research, since it clarifies potential ways to structure future research. From a practical point of view the presented framework can be helpful for managers dealing with tensions, by encouraging creative management control solutions that can enable innovation.

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1 Introduction

Managing innovation has become a central topic in strategy, organization and innovation literature (cf. Eisenhardt et al. 2010). In fast-paced, complex and competitive times, it is suggested that the success of an organization can be explained by its management of innovation (Adams et al. 2006; Brühl et al. 2010). In line with this, it is also stressed that the management of innovation—“in its many forms” (Khazanchi et al. 2007, p. 871)—is an important responsibility of today’s managers (ibid.). In an emerging stream of research, management control—which deals with the question of how to influence employees’ behaviours towards organizational goals (cf. e.g. Alvesson and Kärreman 2004; Malmi and Brown 2008)—is acknowledged as an important aspect of innovation management (e.g. Davila et al. 2009; Janssen et al. 2011; Bedford 2015). It is argued that an organization’s management control system may have an impact on its innovation activities and processes (e.g. Davila et al. 2009; Adler and Chen 2011). Mundy (2010), for example, stresses that not using management control systems, or using them inappropriately, may hamper innovation.

Some literature discussing management control in relation to innovation emphasizes that these two phenomena create competing organizational demands. As an example, managers need to strive for predictable goal achievement while at the same time they have to look beyond predictability to aspire to innovation (see e.g. Simons 1995). Similar competing demands are expressed by Perez-Freije and Enkel (2007), who state that “While some degree of freedom and flexibility is essential for productive innovation teams, management is faced with the challenge of instituting control mechanisms that lead projects in the right strategic direction...” (p. 11). These kinds of competing demands raise tensions in an organization (cf. e.g. Smith and Lewis 2011; Gaim and Wählin 2016). Accordingly, and given that management control and innovation involve competing demands, like the ones mentioned above, it requires a capability to manage tensions (e.g. Breunig et al. 2014; Päril 2014). However, the literature does not offer a clear understanding of tensions at the intersection of management control and innovation. The ongoing debate seems to be rather vague and fragmented. For example, researchers use various terms and definitions when describing and studying tensions—terms and definitions that reflect different views of the tensional relationship between management control and innovation (cf. Gaim and Wählin 2016). Also, it is not definite what the competing demands are and what it means to manage tensions at the intersection of management control and innovation. Further, and considering that innovation management covers both strategic and operative aspects and at different organizational levels (cf. Magnusson et al. 2009), it is unclear where and why competing demands occur.

Previous reviews show that contingency theory is the most frequently used theoretical framework in studies dealing with management control and innovation (Davila et al. 2009). A number of researchers have emphasized the need for other theoretic-

cal approaches when studying management control and innovation (e.g. [Davila et al. 2009](#)) as well as tensions (e.g. [Smith and Lewis 2011](#)). It has also been suggested that there is a need for more empirical studies (e.g. [Gaim and Wählin 2016](#)), particularly qualitative studies and studies that investigate tensions in depth and close to practice (e.g. [Lewis and Smith 2014](#)). It is not clear whether these ideas have had an impact on studies dealing with tensions at the intersection of management control and innovation. Hence, there is a need to investigate and describe recent developments and the present status in this research area.

This paper presents a literature review of articles and studies dealing with tensions at the intersection of management control and innovation. One purpose of the paper is to present—in a synthesized way—the status of the research in the area in terms of types of articles, research methods, theoretical approaches, and tension-related terms used. A second purpose is to conceptually compare the use and interpretations of tension in reviewed articles, as well as to systematically map and categorize highlighted competing demands. In this work, we draw on more general research and conceptualizations on tensions, management control and innovation. A third purpose is to suggest a tension-based framework that is grounded in both previous research on tensions in general and on the specific results of our literature review. An organized framework that builds on previous research may offer new understandings and potential ways to structure future research ([Davila et al. 2009](#)).

This paper contributes to the literature on management control and innovation by focusing on tensions. It is claimed that such a focus may contribute to the research on management control and innovation by increasing our understanding of their relationship (e.g. [Davila et al. 2009](#)). This may in turn increase our knowledge about how to deal with these two phenomena and associated tensions. Furthermore, by presenting the state of the art regarding research on tensions at the intersection of management control and innovation, the paper shows some directions for future research. As another contribution, we add to the literature by clarifying the meaning of tension and by identifying and categorizing competing demands. This addresses the vague and fragmented way in which tensions have been studied and understood to date. As, for example, [Raza-Ullah et al. \(2014\)](#) argue, only after tensions have been identified and conceptualized can they be approached and dealt with. In response to the need for an organized framework, a last contribution is our tension-based framework, which brings some essential tension-related pieces together.

The remainder of the paper is outlined as follows. The next chapter presents the theoretical background, more precisely, theoretical concepts and reasoning that were used when reviewing the literature and when analysing and interpreting its contents on tensions and competing demands. Thereafter, we describe the methodology for identifying and scrutinizing the literature. After describing our literature review process, we present the descriptive results which reflect the status of the research on tensions, regarding, for example, theoretical approaches. This is followed by a more elaborative chapter in which we identify and discuss different types of tensions and categories of competing demands. This chapter ends with our tension-based conceptual framework. Finally, we reflect upon the results and their possible theoretical and practical implications. We also discuss insights for future research.

2 Theoretical background

2.1 Management control and innovation

The discussion regarding the relevance of management control in the context of innovation has changed significantly in recent decades. Previously, formal management control was seen as irrelevant or even detrimental in processes of innovation and development (Bisbe and Otley 2004). For example, Roberts (1991) argues that formal controls, such as budgetary control, stifle innovation and learning because they encourage behaviours driven by egoism, hierarchical dependence and risk aversion. However, in more recent research this traditional view has been questioned, and management control is seen not only as something that can coexist with innovation, but also as a facilitator for innovation (e.g. Davila 2000; Ahrens and Chapman 2004; Bisbe and Otley 2004; Davila et al. 2009; Hausteim et al. 2014).

The field of innovation is characterized by a variety of approaches to and definitions of “innovation” (Adams et al. 2006; Baregheh et al. 2009; Crossan and Apaydin 2010). As Crossan and Apaydin’s (2010) literature review reveals, innovation has been approached as both a process and an outcome. As an outcome, it can take many forms and be of different magnitudes. For example, an innovation can be a product, process, position or business model (see e.g. Francis and Bessant 2005). Seen as a process, innovation addresses several organizational levels, such as individual, group and firm level, as well as different loci, in terms of closed or open processes (Crossan and Apaydin 2010). Considering the purposes and focus of our paper, we approach innovation broadly and adhere to a definition similar to the one suggested by Baregheh et al. (2009). They define innovation as a “multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace” (p. 1334). This definition acknowledges both the outcome—“new/improved products, service and processes”—and the innovation process. It also stresses the aim of innovation, as, for example, to successfully compete on the market. However, they describe the innovation process as “a multi-stage process”. Similar to some other researchers, we suggest that innovation is more complicated than that, involving many parallel and iterative processes at different organizational levels. This is stressed, for example, by Davila et al. (2009). They note: “Innovation is not a monolithic phenomenon but various processes that coexist in parallel, each one requiring different types of control systems” (p. 284). Thereby, they also stress that this has implications for management control. In the context of innovation, management control is multifaceted, covering control systems at the strategic innovation process level as well as, for example, for new product development projects.

However, in innovation literature, the concept of management control is not always explicitly used. Sometimes the phenomenon is dealt with by using other words, such as “innovation control” (e.g. Janssen et al. 2011). At other times it is dealt with more indirectly. For example, in their framework, Crossan and Apaydin (2010) include organizational structure and management systems as firm-level elements that may enable innovation, and project management as an element on a business process level.

These elements can be argued to address issues that are closely related to management control, even if it is not mentioned explicitly.

The literature on management control contains several definitions and conceptualizations on management control and management control systems (MCS) (Strauss and Zecher 2013). More recent models are broader than earlier ones, something which is argued to be relevant in the context of innovation and thus also in line with this paper's approach to management control and MCS. Merchant and Stede (2012), for example, present a broad definition that embraces many different forms of control, including more informal and social ones. They define MCS as "all the devices or systems managers use to ensure that the behaviours and decisions of their employees are consistent with the organization's objectives and strategies" (p. 6; see also e.g. Alvesson and Kärreman 2004). Davila (2000) emphasizes that management control cannot be limited to traditional accounting measures when dealing with innovation and new product development. Instead, a broader set of measures is needed (cf. also Adams et al. 2006, on output and input measures). Hausteijn et al. (2014), for their part, highlight that within the context of innovation, research strives to investigate a holistic view of the entire management control system rather than single control instruments. Such a holistic view is reflected, for example, in Malmi and Brown's (2008) package of controls and Simons' (1995) well-used levers of control model.

Tessier and Otley (2012) present a revised version of Simons' (1995) levers of control model. Their framework focuses in detail on the dual role of management controls in order to promote both innovation and predictability. In their model, managerial controls are categorized into three different dimensions: (1) types of controls (2) purposes of controls, and (3) use of controls. The first dimension takes into account the controls that are available to managers and refers to the type of control—in other words, this dimension addresses the question of *what*. The second dimension describes the purposes of controls and answers the question of *why* management controls are used (cf. MCS roles in Davila et al. 2009). Lastly, the third dimension Tessier and Otley (2012) discuss in their model is use of controls. This dimension relates to managerial intentions and therefore answers the question of *how* management controls are used by managers, for example, how intensely they are used (see e.g. Tessier and Otley's discussion on p. 177).

Accordingly, the discussion regarding the relevance of management control in the context of innovation has changed in the last decades, and many researchers nowadays acknowledge management control as an important factor to consider in the context of innovation. While the importance of management control is stressed, it is also described as a difficult and challenging task (Chiesa et al. 2009; Janssen et al. 2011). One reason for this is that management control and innovation may raise tensions in an organization, as previously suggested.

2.2 Interpretations of and responses to tensions

As mentioned in the introduction, tensions arise when there are competing organizational demands (see e.g. Smith and Lewis 2011). In literature dealing with tensions, these competing demands are often expressed in opposite terms or as opposing ele-

ments, such as stability and change, exploitation and exploration, and efficiency and flexibility (ibid.; [Gaim and Wählin 2016](#)).

Being composed of competing demands, a tension can be labelled and interpreted in different ways. Sometimes tensions are discussed in terms of a duality. In a duality, competing demands are both contradictory and complementary and should be managed simultaneously and in their entirety ([Achtenhagen and Melin 2003](#); see also [Janssens and Steyaert 1999](#)). Another interpretation is reflected in the notions of dilemma and trade-off. According to [Achtenhagen and Melin \(2003\)](#), dilemmas occur when it is difficult to choose between two options with both advantages and disadvantages. A trade-off, on the other hand, can be seen as a number of solutions on a continuum between two opposite poles. Yet another interpretation is expressed when labelling a tension as a dialectic. A dialectic indicates an ongoing process of resolving tensions through integration ([Smith and Lewis 2011](#)). This interpretation incorporates competing demands that can be resolved into a combined synthesis. However, over time new dialectic tensions will emerge that have to be resolved ([Barnson 2014](#)). A last possibility is captured in the term paradox. A paradox is similar to a duality, since neither of them allows for a choice between two options or choices on a continuum. A paradoxical tension is characterized by two competing demands that individually seem logical but when put together seem inconsistent, or even absurd (see e.g. [Smith and Lewis 2011](#)).

Since the terms represent different interpretations of a tension, they also reflect different responses to tensions. For example, whereas a dilemma seems to involve a weighing of pros and cons, a dialectic points at a merger of opposing elements “into a combined element” ([Smith and Lewis 2011](#), p. 386). A trade-off asks for a balance between two opposite poles. [Gaim and Wählin \(2016\)](#) call this response “suppression” since one element is favoured at the expense of the other (p. 35). The question of how to respond to a paradox seems to be a particularly intriguing one, since a paradox cannot be resolved and since it persists over time. Here, one suggestion is to simply learn to live with it, to accept it (see e.g. [Poole and Ven 1989](#), p. 566). Another suggested response to tensions, also presented by [Poole and Van de Ven \(ibid.\)](#), is to separate opposing elements in time or space. This response seems to be a possible alternative when looking at a tension as a duality. It acknowledges that both opposing elements are needed, but they are managed by changing focus from one element to another. A summary of tension-related terms, their interpretations and suggested responses—as described in conceptual papers on tension—is presented in [Table 1](#) below.

However, and as [Smith \(2014\)](#), for example, stresses, these tension-related terms are often used interchangeably and without real consideration of their differences.

2.3 Different perspectives on tension

According to [Smith and Lewis \(2011\)](#), researchers have explored tensions in different ways, for example, as either latent or salient. Latent tensions are defined by [Smith and Lewis](#) as “contradictory yet interrelated elements embedded in organizing processes that persist because of organizational complexity and adaptation” (p. 389). This means that they are embedded and exist naturally within the organization. Several authors

Table 1 Different interpretations of and responses to tensions. (Table developed from: [Lövstål 2008](#), p. 60)

Tension-related term	Interpretation	Suggested response
A dilemma	An impossible choice	Weighing pros and cons Choosing one element
A trade-off	Possible solutions on a continuum	Finding a proper balance Finding the greatest fit
A duality	Contradictory and complementary demands	Separating opposing elements in time or space
A dialectic	Contradictory elements that can be resolved through integration	Creating a new alternative by combining elements
A paradox	Simultaneous presence of contradictory demands that persist over time	Accepting and intensifying Reframing the problem

label this type of tension as an “inherent organizational tension” (see e.g. [Simons 1995](#); [Henri 2006](#); [Hodgson and Briand 2013](#)). [Smith and Lewis \(2011\)](#) define salient tensions as “contradictory yet interrelated elements experienced by organizational actors” (p. 389). Unlike latent tensions, they are social constructions since they are perceived by the actors and captured in their rhetoric. In other words, latent tensions reflect a practitioner’s perspective on tensions.

The notion of tension has also been discussed from different theoretical perspectives. In the literature two overall theoretical perspectives are often discussed and juxtaposed. These are the contingency and the paradox approaches. [Lewis and Smith \(2014\)](#) state that many of the early researchers have responded to organizational tensions by applying a contingency approach. According to them, a contingency perspective addresses tensions as discrete organizational problems that have to be solved. A core premise is that an alignment between managerial decisions and contingencies affects performance in a positive way (*ibid.*). As a result, studies within this theoretical school seek to identify the pros and cons of opposing elements as well as the requirements in the present context in order to determine the option that offers the best fit. However, there are exceptions. [Normann \(1975\)](#) is one such exception since he asks for “misfits”, arguing that “misfits or conflicts [are] highly desirable and necessary” (p. 136; our translation). According to [Gaim and Wählin \(2016\)](#), for example, the contingency approach reflects an either-or perspective, since it is based on choice. From a contingency perspective, a tension should be dealt with by favouring one competing demand at the expense of the other.

[Smith and Lewis \(2011\)](#), as well as [Alvesson and Kärreman \(2004\)](#), stress that there has been a strong tendency in previous management literature to emphasize an either-or orientation to tensions and to adopt approaches such as the traditional contingency one. As an alternative, they advocate a paradoxical approach to tensions, which reflects a both-and perspective (see also [Lewis and Smith 2014](#); [Gaim and Wählin 2016](#)). Such an approach explores tensions across organizational phenomena and at different organizational levels of analysis, similar to the contingency approach

(Smith and Lewis 2011). According to Barnson (2014), a main difference between the two is that a paradoxical approach wants to explore how people can attend to competing organizational demands simultaneously and over time, and not how they should get rid of them. A paradoxical approach assumes that tensions persist within complex and dynamic systems, and that these tensions are beneficial and essential (Smith and Lewis 2011). Therefore, it is important to be able to manage competing demands simultaneously in order to achieve sustainability (Barnson 2014).

Finally, some researchers have also stressed the importance of studying tensions at different organizational levels. Magnusson et al. (2009), as one example, highlight this need in their introduction to a special issue. They suggest that tensions require different solutions at different levels. Therefore, we need to study tensions at an overall firm level, as well as at departmental and project levels. Aubert et al. (2015) claim that one possible way to theoretically elaborate on tensions is to clarify the level of analysis and related competing demands (see also Smith and Lewis 2011).

3 Research design

When conducting our literature review, we considered the guidelines proposed by Tranfield et al. (2003) and Cooper (2009). In order to accomplish a comprehensive and impartial search, we took a multi-step search approach to identify the seminal works dealing with the topic (cf. Lueg and Radlach 2016).

In a first step we determined the keywords and inclusion criteria. Regarding the selection of keywords, we wanted to identify a search string that captured the notion of tension in the context of management control and innovation. Therefore, we started by using three keywords in the search string, in all search fields including title, keywords and abstract:

[“management control*”] and [innovation*] and [tension*]

However, due to our broad definitions of management control and innovation, and due to diverse terminology, we successively—for each keyword—used closely related concepts as well as their abbreviations. The different keywords on tension are based on the conceptual discussion on tension-related terms (summarized in Table 1). However, in addition to these, we also included “balance” as a keyword in the search process. We did this to ensure that our review would include those articles that discussed a balance between competing demands even if they did not explicitly mention specific tension-related terms. Moreover, we used the asterisk as a wild card within the searches. Altogether, our search process covered the following keywords, which formed the total search string (Table 2).

The search process resulted in 105 different search modes.¹ Throughout the search process we considered only peer-reviewed articles published in English-language jour-

¹ For example, 15 search modes could be related to the keyword tension*, that is: (“management control*” AND innovation* AND tension*) OR (“management control*” AND “new product development*” AND tension*) OR (“management control*” AND NPD AND tension*) OR (“management control*” AND “research and development*” AND tension*) OR (“management control*” AND R&D AND tension*) OR (“control system*” AND innovation* AND tension*) OR (“control system*” AND “new product

Table 2 Keywords used in the search process

“Management control*”	Innovation*	Tension*
“Control system*”	“New product development*”	Balance*
“Innovation control*”	NPD	Paradox*
	“Research and development*”	Trade-off*
	R&D	Dilemma*
		Dialectic*
		Dual*

nals. Two additional inclusion criteria were that the articles should be within (1) the subject area of management/business and considered as either (2) an original or theoretical paper (therefore review articles were excluded). Regarding publication year, we initially planned to include only articles published in 2000 or later, since the main aim of the review was to investigate recent developments and the present status of the research. We later extended the period to 1990–2015 in order to see the development over a longer time period. However, this extension resulted in only two more articles.

In the second step, we performed database searches in Google Scholar and scientific databases, such as Business Source Complete (EBSCO), Emerald, SAGE, Social Science Citation Index (SSCI), Science Direct and Wiley. Moreover, to accomplish an adequate search, complementary search strategies were needed to find relevant studies (Cooper 2009). Therefore, to ensure that relevant studies were found, our search strategy also included the scrutiny of recommended articles and reference lists. This search eventually resulted in a catalogue of nearly 250 articles, after eliminating duplicates.

Third, we performed a cursory content analysis of the remaining articles, primarily by reading titles and abstracts. By doing this, we eliminated articles that did not cover the topic of our research and/or did not meet our inclusion criteria despite being selected in the search. For example, by including the keyword “balance*” we received a number of articles that dealt with balanced scorecard but did not discuss competing demands or tensions. The keyword “control system*” also resulted in a number of irrelevant hits. Further, not all of the databases could properly handle the inclusion criteria of subject area. Therefore, a number of articles within other scientific areas, such as medicine, computer science and engineering, had to be removed. The search processes and content analyses finally left us with 47 articles.

In the fourth and final step, we analysed the 47 articles in three processes, namely, (1) a general extraction process, (2) a topic-specific extraction process, and (3) a syn-

Footnote 1 continued

development*” AND tension*) OR (“control system*” AND NPD AND tension*) (“control system*” AND “research and development*” AND tension*) OR (“control system*” AND R&D AND tension*) OR (“innovation control*” AND innovation* AND tension*) OR (“innovation control*” AND “new product development*” AND tension*) OR (“innovation control*” AND NPD AND tension*) OR (“innovation control*” AND “research and development*” AND tension*) OR (“innovation control*” AND R&D AND tension*).

thesizing analysis on tensions (cf. [Tranfield et al. 2003](#)). The first process involved the development of a data-extraction form containing general information such as title, author, publication details, article type, empirical setting, and methodology and data collection methods. Thereafter, a second extraction—more related to tensions—was conducted. Here, we documented the occurrence of tension-based terms, mentioned opposing elements, and theoretical approaches used. This extraction process required more careful reading of both abstracts and articles. We started the process by independently analysing articles and thereafter discussing and comparing our results, as suggested by, for example, [Tranfield et al. \(2003\)](#). These discussions also resulted in adjustments and changes in the extraction form. After we had developed a joint view of the extraction process, we divided the articles between us and analysed them separately. The results of the two extraction processes are mainly presented in Sect. 4. Finally, we conducted a synthesizing analysis on tensions with the aim of summarizing and integrating results and characteristics of previous studies and articles ([Tranfield et al. 2003](#); [Cooper 2009](#)). In our case, this synthesis was conducted in a qualitative way, looking for differences and similarities related to, for example, highlighted opposing elements, interpretations of tensions and types of tensions. This process required a lot of collaboration, discussion and reading. Here, we also used conceptual models and categorizations presented in Sect. 2, related to both management control (e.g. [Tessier and Otley 2012](#)) and tension (e.g. [Smith and Lewis 2011](#)), as inspiration and support for our work. The results of our synthesizing analysis are presented in Sect. 5.

4 Descriptive results of literature review

4.1 Publication and types of articles

A table summarizing the results from our general extraction process of the articles can be found in “Appendix 1”. It presents information about the author, journal, article type, methodology and data collection methods. “Appendix 2” summarizes the represented journals and their frequencies; it reveals that 29 different journals are included in our review. Most of the journals (22) have only one article dealing with the topic; *Accounting, Organization and Society* stands out, however, with nine relevant articles.

A majority of the journals are within the fields of accounting and management control. However, general management journals, such as *European Management Journal*, and journals within innovation management are also represented. For example, two articles were published in the *Journal of Product Innovation Management*.

Figure 1 presents the publication years of the reviewed articles. The dotted line in the diagram implies an increased interest in the issue of tensions at the intersection of management control and innovation. In the 90s and the very beginning of 00s, only three articles were published. In the middle of the 00s we can see a slight increase. We found no publication in 2008, but a large increase in the following year compensates for that. Since 2009, articles on the topic were published at a fairly constant rate, and at a generally higher level than previous years.

Figure 1 also presents the frequency of types of articles—original or theoretical—in each year. In total, original articles, presenting empirical findings and observations,

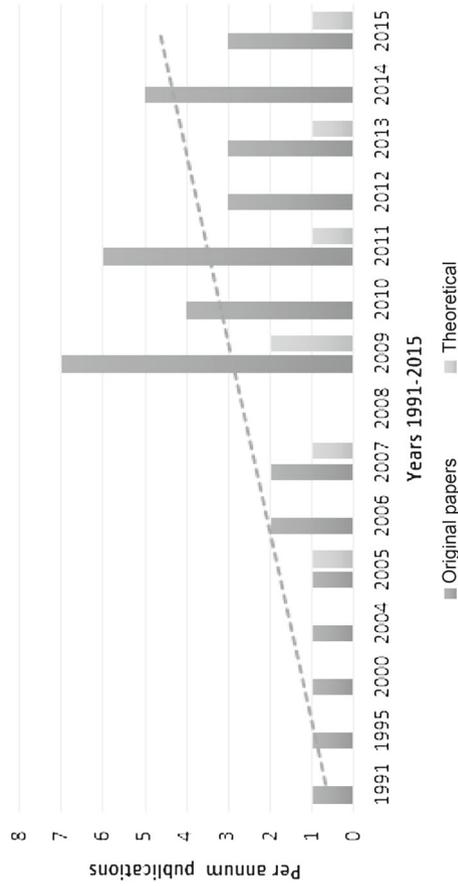


Fig. 1 Frequency of publication year and types of articles (n = 47)

were the most common; 40 (85%) of the articles were classified as original. Seven theoretical articles (15%) were found in the review process.

4.2 Methodology and data collection methods

Among the 40 original articles, 24 (60%) were interpreted as having mainly a qualitative methodology. In the remaining 16 articles (40%), a quantitative methodology was used. Figure 2 presents a more detailed description of the research strategies used.

As the diagram reveals, almost two-thirds of the relevant articles used a case-study approach. Among the studies, 13 (32%) were conducted within a single organization. Almost as many (11) employed a case-study approach in two or more organizations. Fifteen (38%) of the 40 original articles presented empirical findings from a survey study. One study adopted a case-survey approach. This is the study by Davila et al. (2009), which is based on a cross-sectional, multi-method and multi-case field research design.

Regarding data collection methods, *interviews* were the most common one in studies using a case-based methodology. However, other data collection methods were also used, including *participant observation* and *archival data*. Some of these studies have taken an in-depth exploratory case-study approach that combines observations with archival data and interviews. Within the survey studies, *questionnaires* were used either as the sole method or combined with interviews. Through our analysis we noted that the empirical material is based almost exclusively on interviews with and questionnaires directed towards managers in the organization; the managers were at various levels and in different departments. The employee perspective is missing in most studies. Only a few studies, which have the team as the level of analysis, incorporated the team members in the empirical investigation. Information about methodological approaches, research strategies and data collection methods on each individual article can be found in “Appendix 1”.

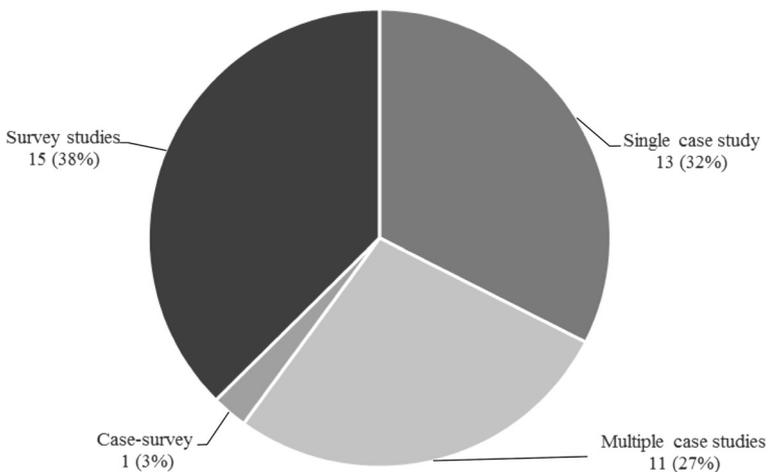


Fig. 2 Distribution regarding research strategies 1991–2015 (n = 40)

4.3 Tension-related terms

One of the requirements for including an article in the literature review was that a tension should be explicitly stressed, by using either one or several tension-related terms (presented in Table 1) or by discussing it in terms of a balance between competing demands. In 38 of the 47 articles, the overall term “tension” occurs. However, several other tension-related terms and expressions appear in the articles, either alone or in parallel with others. The number of articles using each term is illustrated in Table 3. More detailed information about the usage of tension-related terms is presented in the last column of “Appendix 1”.

The concept of “balance” is the second most common term (referred to in 34 articles; e.g. [Kruis et al. 2015](#)). Next after “balance” come “paradox” (in 11 articles; e.g. [Pärl 2014](#); [Aubert et al. 2015](#)), “trade-off” (in 10 articles; e.g. [Harris et al. 2009](#); [Jørgensen and Messner 2010](#)), “dilemma” (in nine articles; e.g. [Kivisaari 1991](#); [Perez-Freije and Enkel 2007](#); [Knardal and Pettersen 2015](#)), and “dialectic” (in seven articles; see [Theule and Fronda 2005](#); [Jeacle and Carter 2012](#)). The term “duality” occurs in seven articles, in expressions such as “dual challenge” ([Adler and Chen 2011](#)), “dual objective” ([Brattström and Richtnér 2014](#)) and “dualism” ([Revellino and Mouritsen 2015](#)). A less commonly used term, which is not captured in Table 1, is “antithetical” (referred to in three publications; [Chenhall and Morris 1995](#); [Goodale et al. 2011](#); [Hodgson and Briand 2013](#)). In 16 articles, the overall terms “tension” and “balance” were the only ones used, either alone or together. In the remaining articles, the more specific terms (i.e. paradox, trade-off, dilemma, dialectic, duality or antithesis) occur. In 13 articles, two or three of these terms were used in parallel. Regarding the use of the different tension-related terms over time, “duality” was not used in the earlier articles. It appeared first in 2009. Besides this, our review does not indicate that the frequencies of the terms changed during the review period.

In many articles the terms are used without any further definition or explanation. When they are explained it is frequently done in terms of “contradictory logics” ([Brunig et al. 2014](#)), “competing demands” ([Frow et al. 2005](#)), “a conflicting pressure” ([Knardal and Pettersen 2015](#)) and “opposing logics” ([Pärl 2014](#)). One exception, in which the meaning of the term is elaborated on, is the article by [Aubert et al. \(2015\)](#). They discuss the interpretation of “paradox” by referring to, for example, [Eisenhardt](#)

Table 3 Number of articles using tension-related terms

Tension-related term	Number of articles using the specific term (n = 47)
Tension	38
Balance	34
Paradox	11
Trade-off	10
Dilemma	9
Dialectic	7
Duality	7
Antithesis	3

Table 4 Theory approaches used

Theory approach	No. of articles	References
Contingency approach	20	E.g. Davila (2000), Perez-Freije and Enkel (2007), Verbeeten and Boons (2009) and Canonico and Söderlund (2010)
Practice-oriented approach	8	E.g. Jørgensen and Messner (2010), Akroyd and Maguire (2011) and Breunig et al. (2014)
Dynamic capabilities approach	4	E.g. Henri (2006), Harris et al. (2009) and Brühl et al. (2010)
Paradox (duality) approach	2	E.g. Carter et al. (2013) and Aubert et al. (2015)
Other/none	13	

(2000) and Smith and Lewis (2011). They end up defining a paradox as “the joint existences of two elements that seem logical when considered in isolation, but appear incompatible when considered together” (p. 256). In addition, a couple of articles elaborate on the notion of balance (e.g. Mundy 2010; Kruijs et al. 2015). This notion seems to cause more discussion, probably because it raises different interpretations. Some scholars question the term “balance” since it gives an image of “equal weight” (Kruijs et al. 2015). A suggestion is to replace balance, or at least think of it as a “combination” of elements (ibid.; see also Henri 2006; Ylinen and Gullkvist 2012). Mundy (2010), for her part, questions the idea of balance as a static position. Instead, she suggests that balance should be regarded as an ongoing process of creating a “dynamic tension” (ibid.; see also Henri 2006).

4.4 Theoretical approaches

In our second extraction process, we also considered theories and theoretical approaches adopted in the reviewed articles. In some cases these were difficult to identify since they were not always clearly and explicitly declared. There were also different kinds of theories, covering a spectrum from broad overall theoretical perspectives to specific theoretical concepts. In a few articles, we could also see a combination of two theoretical approaches. In these cases, we chose the most prominent one.

In the reviewed articles, we identified four theoretical approaches that were used more than once. The contingency and paradox approach, discussed in Sect. 2.3, were among those. The theories used were sometimes stated explicitly and sometimes revealed implicitly by the use of key concepts such as “contingent”, “practices”, or “capabilities”. The results are presented in Table 4, together with some examples of articles.

The contingency approach stands out. It was adopted in 20 articles and is thus the most frequently used theory. Eight studies used a practice-oriented approach, whereas the dynamic capability theory occurred in four articles. A clear paradox approach, which has been suggested by several authors (e.g. Eisenhardt 2000; Lewis and Smith 2014; Gaim and Wählin 2016), was clearly used in two articles (Carter et al. 2013;

Table 5 Theoretical questions at the intersection of management control and innovation

Theory approach	Underlying question
Contingency approach	How can a MCS be designed to fit internal and external characteristics related to innovation (and thereby suppress tensions)?
Practice-oriented approach	How are management controls used and tensions experienced and dealt with in practice in innovative settings?
Dynamic capabilities approach	How can management control systems be used to create a dynamic capability of dealing with both innovation and control?
Paradox approach	How can competing demands of management control and innovation exist simultaneously?

Aubert et al. 2015). Besides these four theoretical approaches, a number of other theories were used as a theoretical lens in the articles, including motivation theory (Adler and Chen 2011), organization theory (Arto et al. 2011), management control theory (Ecker et al. 2013), innovation management theory (Breunig et al. 2014), and network theory (e.g. Revellino and Mouritsen 2009). In some articles, it was not possible to identify any specific theory or theoretical approach.

An attempt to describe how the four mentioned approaches address the question of tensions at the intersections of management control and innovation is presented in Table 5.

As clarified in Sect. 2.3, a *contingency approach* searches for an alignment between managerial decisions and internal and external contingency factors. The idea is that a “good fit” will remove tensions. In the context of management control and innovation, a contingency approach addresses the question of how to design a MCS which fits, for example, the characteristics of an innovative company or an innovative process (see Hausteijn et al. 2014 for a review). Studies that use a *practice-oriented approach* aim to investigate how management controls are used and how tensions are dealt with in a particular innovative setting. The focus is on *practices* which can be defined as activities that people within a specific setting do on a regular basis (see e.g. Akroyd and Maguire 2011). This type of studies rarely uses hypothesis for generating explanations and predictions (ibid.). Instead they try to uncover patterns of activities, often by using case studies and field research (e.g. Breunig et al. 2014). The *dynamic capability approach*, which can be argued to reflect a “both-and” perspective, has been used by, for example, Brühl et al. (2010). Referring to Teece et al. (1997), they describe dynamic capabilities as a firm’s ability to use resources and competences to deal with changing environments. They further stress that dynamic capabilities are firm specific and embedded in processes and routines. Regarding management control and innovation, a dynamic capability can enable a firm to integrate these processes and to balance their competing demands in a competitive way. Mundy (2010), for example, stresses that a combination of different uses of management controls may create a dynamic tension and a unique organizational capability (see also Henri 2006). The *paradox approach*, lastly, has similarities with the dynamic capability approach since it assumes that tensions are fruitful and should not be suppressed. From a paradox

perspective, a central question in the context of management control and innovation concerns how the competing demands that these two phenomena create can exist simultaneously. According to [Gaim and Wählin \(2016\)](#) this can be accomplished by rethinking the relationship between competing demands. By framing a tension between management control and innovation as a paradox, creative solutions to competing demands may be discovered; solutions which integrate and even reinforce competing demands (see e.g. [Aubert et al. 2015](#)).

4.5 The status of research on tensions at the intersection of MC and innovation

Our review shows that the number of publications dealing with tensions at the intersection of management control and innovation increased during the review period, indicating an increased research interest in the topic. Although rarely studied in the 1990s, a handful of articles have been published each year since 2009. The reviewed articles are published in a variety of journals. However, journals in the areas of accounting and management control dominate, which may suggest that the question of tensions has particularly interested scholars within management control.

Among the reviewed articles, 40 were original ones presenting empirical findings and observations. The remaining seven articles were theoretical. This is an interesting finding, since the debate regarding tensions often seems to be a conceptual and ontological one. There is an ongoing discussion regarding, for example, the nature of tensions and how to respond to them, as well as the most fruitful theoretical approach to tensions. However, our analysis of the characteristics of the included studies reveals that the issue of tensions is also empirically driven. The results regarding methodological approaches and research strategies are also interesting, and they differ from the results of Davila, Foster and Oyon's (2009) literature review. Having reviewed articles on innovation and management control, they concluded that most empirical studies rely on cross-sectional survey research designs, primarily suited for testing hypotheses. In our review, 59% of the empirical studies are based on a case-study strategy. One explanation for this difference may be that there has been a shift towards more case-based studies within the fields of management control and innovation in general in recent years. Another possible explanation is that we add the dimension of tension in our review. Researchers interested in tension-related issues may be more likely to use case studies. Or maybe a case-study methodology is more suitable when dealing with tensions, which, for example, [Smith and Lewis \(2011\)](#) suggest. Among the articles, the contingency approach was the most frequently used theoretical approach, which is in line with the results of, for example, Davila, Foster and Oyon's (2009) review. It indicates that contingency theory is still important when doing research at the intersection of management control and innovation. It was also used despite some criticism regarding its capacity to deal with tensions in a dynamic way (see e.g. [Smith and Lewis 2011](#); [Aubert et al. 2015](#)).

Regarding tension-related terms, our review found that these were used in a variety of ways. The overall terms of "tension" and "balance", "paradox" and "trade-off" are the most commonly used. As [Smith \(2014\)](#) stresses and as our review indicates, the tension-related terms are often used interchangeably and without real consideration of their differences.

5 Tensions, competing demands and opposing elements

5.1 Type of tensions

Since the reviewed articles varied in many respects, for example, in conceptual use, theoretical approaches, research purposes, and empirical investigations, they also approached tensions in many different ways. Inspired by Smith and Lewis's (2011) distinction between latent and salient tensions (see Sect. 2.3), we started to think in terms of *types of tensions*. Our analysis then reveals that the authors use the notion of tension² in several ways, reflecting contrasting meanings and types of tension. In one sense, it refers to a natural and embedded organizational tension. As mentioned in Sect. 2.3, these types of tensions are often labelled *inherent organizational tensions* (see e.g. Henri 2006; Hodgson and Briand 2013; Ylinen and Gullkvist 2014) or as in Smith and Lewis's model "latent tensions" (2011). Considering the focus of our review, an important inherent organizational tension, mentioned in many articles, is an inherent tension between *innovation and control*. Such tension is expressed in the quotation by Perez-Freije and Enkel (2007), which was mentioned in the introduction. It reads, "While some degree of freedom and flexibility is essential for productive innovation teams, management is faced with the challenge of instituting control mechanisms that lead projects in the right strategic direction..." (p. 11).

The idea of an inherent tension between innovation and control appears in most (at least 40) of the articles. It is expressed in various ways, depending, for example, on organizational level and focus of study. Therefore, it will be further elaborated on in the next Sect. 5.2. This type of tension is often mentioned in the introduction as a way of introducing the research topic and arguing for its relevance. Sometimes it is only mentioned in the introduction and is not further elaborated on or returned to. None of the reviewed articles develop or present a more developed framework that captures different dimensions of inherent innovation-control tensions. When it comes to the inherent tensions, they often seem to be viewed as dualities or paradoxes, even if they are not always explicitly labelled as such. It means that they are often regarded as tensions that hold opposing and interrelated elements (Smith and Lewis 2011) and require responses that deal with both elements simultaneously. However, in some cases they also seem to be interpreted as trade-offs, suggesting a choice of different options on a continuum.

A second type of tension that is found in the articles relates to a *management control tension*, a tension that exists due to different and competing roles and uses of management controls. Sometimes this management control tension is depicted as an inherent organizational tension as well, in other words, as a natural tension that has to be dealt with. This is the case, for example, when Davila (2000) stresses the competing roles of management control systems, to reduce uncertainty and goal divergence at the same time (see also Akroyd and Maguire 2011; Artto et al. 2011). However, a more common way to describe management control tensions is to depict them as *created* tensions. From this view, management control tensions appear due to a com-

² When we use "the notion of tension" we refer to the general idea of tension, irrespective of which tension-related term is actually used.

bination of various elements and uses of management controls (see e.g. [Henri 2006](#); [Mundy 2010](#)), for example, by combining formal and informal controls (e.g. [Silaen and Williams 2009](#)), or mechanistic and organic controls (e.g. [Ylinen and Gullkvist 2012, 2014](#)). In this context, the word “balance” (e.g. [Mundy 2010](#)) often occurs. A common idea seems to be that a good combination and a good balance of opposing elements of control can either reduce a tension or—as a somewhat different view—create a “dynamic tension” (see e.g. [Mundy 2010](#)). From a practical point of view, a crucial thing—when the ambition is to both demonstrate an innovation capacity and embrace formal controls (cf. [Adler and Chen 2011](#), p. 64)—is then to combine various opposing control elements (see Sect. 5.3 for an elaboration on opposing management control elements). This type of created management control tension is conceptually elaborated on to a larger extent than the inherent ones. Therefore, discussions regarding this type of tension are found in the articles in conceptual and theoretical sections as well as in discussions and conclusions.

The third, less common, type of tension appears mainly in articles that adopt a practice-oriented approach. It represents specific tensions that practitioners (e.g. managers and product developers) confront in their decision-making about innovation and product development. Contrary to the inherent tensions, these can be regarded as social constructions since they are experienced by the actors ([Smith and Lewis 2011](#)). This type of tension is apparent in a handful of articles examining, for example, tensions between strategic goals (e.g. [Jørgensen and Messner 2010](#)), management accounting calculations ([Mouritsen et al. 2009](#)) or between quality and costs ([Jeacle and Carter 2012](#)). It seems to reflect an either-or approach more than previous types, suggesting an ongoing compromise between, for example, stakeholders’ demands and different project targets. In some of these articles, the tensions are also explicitly discussed in terms of a trade-off (e.g. [Jørgensen and Messner 2010](#)) or a dilemma (e.g. [Knardal and Pettersen 2015](#)). Naturally, these tensions are mostly dealt with in case descriptions or similar.

5.2 Categories of inherent innovation-control tensions

As mentioned in the previous section, the inherent innovation-control tension is touched upon in most articles. Often it is captured by explicitly using the specific concepts of innovation and control and presenting them as opposing elements. However, the overall tension of innovation and control is also described in many supplementary ways, covering various aspects related to innovation and management control. When viewed together, the reviewed articles accentuate a disorganized variety regarding inherent innovation-control tensions. There are also few attempts to more conceptually organize the presented tensions. A greater conceptual clarity could therefore be desirable to enable more fruitful theoretical discussions and to guide future research (cf. [Smith and Lewis 2011](#)). One example of such a framework is found in the field of design management and in the article by [Cautela and Zurlo \(2011\)](#), in which they present a system of tensions faced by design managers. Here, then, we see a possibility for conceptual development based on our review and with a focus on inherent innovation-control tensions.

Accordingly, we tried to see patterns among the described innovation-control tensions by relating them to the level of analysis. As stressed in Sect. 2.3, several researchers have asked for such attempts. In Table 6, inherent innovation-control tensions are thus organized in terms of five levels and their related competing demands. They are further expressed in terms of opposing elements that reflect either an innovation or control element.

As the table reveals, innovation is expressed in terms of elements such as creativity, empowerment, uncertainty, freedom, flexibility, open boundaries and trust. The control element is captured in terms of efficiency, accountability, goal congruence, discipline, standardization and safeguarding. Similar to [Smith and Lewis \(2011\)](#), our analysis reveals that some opposing elements—or at least very similar opposing elements—occur at several levels. However, we can also see differences between the levels. Tensions that are mentioned at the unit/division level often address competing demands related to organizational design and management, reflected in opposing elements such as empowerment-accountability and autonomy-centralization. At the project level, the tension between uncertainty in new product development projects and goal congruence with the organization's financial and strategic goals, for example, is stressed (e.g. [Akroyd and Maguire 2011](#); cf. also [Davila 2000](#)). Tensions presented at the interorganizational level focus on aspects related to collaboration and relational issues, such as trust and coordination. This level also addresses tensions related to openness versus closedness (“safeguarding”; e.g. [Brattström and Richtnér 2014](#)).

5.3 Categories of management control tensions

As previously stated (in Sect. 5.1), a number of articles deal with management control tensions. Having scrutinized these articles, we can conclude that the management control elements discussed and studied cover several management control dimensions. Accordingly—and similar to the inherent organizational tensions—the articles and presented studies vary with respect to management control dimensions. It further means that a wide range of management control frameworks (cf. e.g. [Haustein et al. 2014](#)) are adopted. The most commonly used framework is Simons' (1995) levers of control, primarily his ideas about interactive and diagnostic uses (e.g. [Knardal and Pettersen 2015](#)). Some studies take as their point of departure Adler and Borys' (1996) framework and their distinction between enabling and coercive controls (e.g. [Mundy 2010](#)) or Chenhall's (2003) mechanistic and organic controls (e.g. [Ylinen and Gullkvist 2012, 2014](#)). A number of authors also refer to [Malmi and Brown \(2008\)](#) and their ideas about “packages of controls”.

With the aim of creating a synthesized picture of management control dimensions and associated tensions, we have categorized them into three areas: (1) types of controls, (2) purposes of controls, and (3) use of controls. In this work we were particularly inspired by the framework of [Tessier and Otley \(2012\)](#), as mentioned and briefly described in Sect. 2.1.

In Table 7, we have structured those management control tensions that are mentioned and sometimes also empirically studied in reviewed articles, in line with the three categories of management control dimensions.

Table 6 Categories of inherent innovation-control tensions

Level	Competing demands		E.g.	
	Opposing elements	Innovation element	Control element	
Organization level	Strategic competing demands	Renewal/ innovation	Predictable goal achievement	Frow et al. (2005) and Bisbe and Malagueño (2009)
		Creativity	Resource efficiency	Brühl et al. (2010)
		Corporate entrepreneurship	Operations control	Goodale et al. (2011)
		Uncertainty	Control	Eldridge et al. (2014)
Unit/division level	Competing organizational design demands	Management for differentiation	Management for interdependencies	Kivisaari (1991)
		Collective cooperation	Individual accountability	Frow et al. (2005)
		Bottom-up tinkering	Top-down governance	Canonica and Söderlund (2010)
		Empowerment	Accountability	Artto et al. (2011)
		Autonomy	Centralization	Ecker et al. (2013)

Table 6 continued

Level	Competing demands		Opposing elements		E.g.
			Innovation element	Control element	
Project level	Competing demands in process		Uncertainty	Goal congruence	Akroyd and Maguire (2011)
			Creativity	Control	Hodgson and Briand (2013)
			Freedom	Discipline	Davila (2000) and Artto et al. (2011)
			Individual autonomy	Management control (alignment)	Breuing et al. (2014)
			Flexibility	Standardization	Aubert et al. (2015)
Individual level	Competing activity demands		Demonstrate creativity	Embrace formal controls	Adler and Chen (2011)
Inter-organizational level	Relational competing demands		TRUST	FORMALIZATION	Vlaar et al. (2007);
			Creativity	Coordination	Adler and Chen (2011)
			Open boundaries	Safeguarding	Brattström and Richnér (2014)
			Non-hierarchical relationships	Centralized governance	Carter et al. (2013)
			Flexibility	Contracts	Aubert et al. (2015)

Table 7 Categories of management control tensions

MC dimension	Tension	E.g.
Types of controls	Non-financial–financial controls	Davila (2000)
	Informal–formal controls	Silaen and Williams (2009)
	Organic–mechanistic controls	Ylinen and Gullkvist (2012)
	Trust–formal controls	Brattström and Richtnér (2014)
Purposes of controls	Pursue strategic initiatives–implement strategies	Frow et al. (2005)
	Uncertainty reduction–goal congruence	Akroyd and Maguire (2011)
	Build trust–safeguarding	Brattström and Richtnér (2014)
Use of controls	Freedom–avoid opportunistic behaviour	Aubert et al. (2015)
	Relational–instrumental	Vosselman and van der Meer-Kooistra (2009)
	Loose–tight	Davila et al. (2009)
	Enabling–coercive	Mundy (2010)
	Interactive–diagnostic	Artto et al. (2011)

As shown in the table, the reviewed articles address several management control dimensions and cover many different tensions, most of them mentioned above. Of the three categories, tensions related to types and use of controls are most frequently elaborated on. The category of control purposes is not so well represented. Among the specific tensions, the tension reflected in a combination of interactive and diagnostic uses is the one that is discussed and studied the most. How the presented tensions are approached by the authors and in empirical studies depends upon the theoretical perspective adopted.

5.4 A tension-based framework

Based on both previous research in general and on the specific results of our literature review, we present a tension-based framework in Table 8. The framework summarizes the discussions regarding tensions in the following aspects: actor perspective, type of tension, theoretical approach, interpretation and response. The presented framework could be seen as an attempt to create some form of unifying platform, which Smith and Lewis (2011) ask for. They argue that such a platform can “spur continued theoretical debate and guide future empirical research” (p. 397).

To start with, the framework distinguishes between two different actor perspectives on tensions. These actor perspectives are based on the theoretical Sect. 2.3, and are further developed in Sect. 5.1. The researcher’s perspective addresses tensions as they are approached and conceptually developed by researchers. The practitioner’s perspective, on the other hand, refers to tensions as they are experienced, dealt with and expressed by practitioners. To continue, the researcher’s perspective involves three types of tensions, previously described in Sect. 5.1. They are (1a) inherent innovation-control

Table 8 A tension-based framework at the intersection of MC and innovation

Actor perspective	Type of tension	Theoretical approach	Interpretation	Response
Researcher's	(1a) Inherent innovation-control tensions	Contingency	Trade-offs Dualities	Select the best option Separate in time or space
	(1b) Inherent management control tensions	Paradox	Dialectics Paradoxes	Integrate
	(2) Created management control tensions	Dynamic capability	Dynamic tensions	Balance Combine
Practitioner's	(3) Decision-making tension in innovation practices	Practice-oriented	Dilemmas Trade-offs	Compromise Balance

tensions, (1b) inherent management control tensions, and (2) created management control tensions. As can be seen, the framework does not fully separate inherent innovation-control tensions and inherent management control tensions since both are depicted as tensions that exist naturally in the organization. The practitioner's perspective reflects a fourth type of tension, that is, decision-making tensions that practitioners face in, for example, innovation processes. Accordingly, by specifying several types of tensions and by relating them to two actor perspectives we refine Smith and Lewis's (2011) distinction between latent and salient tensions.

The third column in the framework presents the four theoretical approaches that we identified in our review. They are linked back to type of tension, as well as associated with different interpretations and responses to tensions. The theoretical approach can thus be seen as an element which links the left part of the table with the right one. Inherent innovation control tensions and inherent management control tensions are primarily studied and discussed by using either a contingency or a paradox approach. The idea of a created management control tension occurs in articles which are based on a dynamic capability approach. The last type of tension is addressed primarily in studies that use a practice-oriented theoretical approach.

The fourth column in the framework presents different interpretations and conceptualizations of tensions, whereas the fifth column suggests some responses to tensions. Both these elements are dependent on the theoretical perspective. From a contingency perspective, tensions seem mostly interpreted as trade-offs or dualities. Interpreted as a trade-off, a relevant response to a tension is to select the option that best fits the situation. When interpreted as a duality, a suggested response is to separate competing demands either in space or in time. Brattström and Richtner (2014), for example, suggest that the responsibility of formal controls should be assigned to a department other than the one that performs it. They call this separation in space a "good cop-bad cop strategy". From a paradox perspective, inherent organizational tensions are interpreted as paradoxes or dialectics. It means that tensions are composed of competing demands that exist simultaneously and persist over time (cf. Aubert et al. 2015). Here, one suggested response which occurs in the articles is to integrate opposing elements, for example, by using management accounting or management control systems as "integration tools" (e.g. Brühl et al. 2010; Knardal and Pettersen 2015) or as "mediating instruments" (e.g. Jeacle and Carter 2012; Päril 2014). The type of tension that we call a "created management control tension" is often discussed in terms of a dynamic tension. Here, the idea is to create a tension by balancing or combining different types, purposes or uses of controls (e.g. Henri 2006; Mundy 2010; Ylinen and Gullkvist 2014). Finally, the "decision-making tension in innovation practices", which is the fourth type of tension, is interpreted as trade-offs and dilemmas since they seem to entail an ongoing compromise for actors and departments and between, for example, competing goals.

6 Conclusions

This paper has presented a literature review of articles and studies dealing with tensions at the intersection of management control and innovation. One purpose of the paper

has been to present the status of the research in the area in terms of types of articles, research methods, theoretical approaches, and tension-related terms used. Our review shows an increase in the number of publications during the review period, indicating an increased interest in the topic. However, the number of published articles is still small. Since 2009, a handful of articles have been published each year. Our literature review further reveals that the issue of tensions is not only of theoretical interest, since original articles, presenting some empirical findings and observations, dominated. Based on our review process, we can also conclude that a qualitative methodology and case-study research are commonly used in the empirical studies. Further, the contingency approach is still an important theoretical approach in research on management control and innovation (cf. Davila et al. 2009), and also when adding the aspect of tension. Regarding tension-related terms, our review shows that many terms are used in the articles, often interchangeably and without really clarifying their definitions. In other words, there is some confusion and ambiguity regarding the terms (cf. Smith and Lewis 2011).

This part of the review contributes to research on management control and innovation by providing an updated and tension-focused picture of the research status. It also brings some suggestions for future research. Considering the dominance of the contingency approach, there is a need to develop the notion of tensions from other theoretical perspectives and in relation to different tension-related terms. There are some articles that (conceptually and profoundly) elaborate on tensions from a paradoxical perspective (e.g. Gaim and Wåhlin 2016). Similar elaborations could be done from other theoretical perspectives. What does it mean to approach tensions from a dynamic capability perspective, for example? There is also a need to empirically study tensions at the intersection of management control and innovation using other theories and theoretical approaches than the contingency one. Empirical studies that are based on a clear paradox approach, for example, are rare, despite the fact that it has been claimed to be a fruitful approach when studying tensions (e.g. Gaim and Wåhlin 2016). Another suggestion for further research is to incorporate the employee perspective using a practice-oriented approach. How do employees perceive tensions between management control and innovation as well as the managers' way of dealing with them?

A second purpose of the paper was to compare the use and interpretations of tension in the reviewed articles, as well as to systematically map and categorize highlighted competing demands. In this analysis work, we draw on more general research and conceptualizations regarding tensions, management control and innovation. Through the analysis we identified four types of tensions: (1) inherent innovation-control tensions, (2) inherent management control tensions, (3) created management control tensions, and finally (4) decision-making tensions in innovation practices. The inherent and practice-oriented tensions have similarities with Smith and Lewis's (2011) latent and salient tensions. Latent tensions—or inherent tensions—exist naturally in organizational processes due to, for example, complexity, whereas the salient ones are experienced by organizational actors (ibid.). We have also initiated a categorization of inherent innovation-control tensions based on different organizational levels and related competing demands, in line with Aubert et al. (2015) suggestion. Inspired by Tessier and Otley (2012), we further present a categorization of management control tensions in terms of (1) types of controls, (2) purposes of controls, and (3) use of

controls. Lastly, we have suggested a tension-based framework that holds actor perspective, type of tension and related theory approaches, as well as interpretations of and responses to tensions at the intersection of management control and innovation.

In doing the above and by developing two categorizations and a framework, we contribute to the literature by systematically organizing tensions at the intersection of management control and innovation. Hereby, we also enable a more precise debate on tensions. From a practical point of view, our framework makes a contribution by suggesting solutions to different types of tensions. It also clarifies the link between theoretical approaches, interpretations of tensions and responses to tensions. Our categorizations further point at some possibilities for future empirical studies. The categorization of inherent innovation-control tensions indicates that there are several organizational levels that can be in focus. Davila et al. (2009) argue that the organizational level is too aggregated to allow for an understanding of the relationship between management control and innovation. One suggestion for further research could therefore be to conduct studies at other levels. Since innovation processes and activities are often described as interactive, a focus on the interorganizational level and on relational competing demands could be one fruitful alternative. Further, both categorizations hold a number of tensions and opposing elements, which could be more closely looked into. Regarding, for example, use of controls, the balance between interactive and diagnostic uses has been quite well researched. The tight-loose dimension, as one example, has not been studied to the same extent.

The findings of our paper and study have some limitations, which give further suggestions for future research. Some limitations are related to our literature review. Although we have tried to capture all articles dealing with the subject according to our inclusion criteria, we have probably missed relevant articles. Selected keywords may, for example, have favoured articles in the area of management control. Additional reviews using other search strategies would therefore be a possibility for future studies. With the ambition to get an overall picture of the ongoing debate on tensions at the intersection of management control and innovation, we made a broad review. Because of this ambition, together with the limited number of reviewed articles (47 articles), our integrated framework should be regarded as a tentative one. Some interpretations and suggestions are based on quite a small number of observations. A closer look at and analysis of some selected parts of the framework could be one way of refining and developing the framework.

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7 Appendix 1

See Table 9.

Table 9 Summary of descriptive results (n = 47)

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Adler and Chen (2011)	Accounting, Organization and Society	Theoretical			Tension Balance Paradox
Akroyd and Maguire (2011)	Qualitative Research in Accounting and Management	Qualitative	Single case study	Participant observation	Dual challenge Tension
Artto et al. (2011)	International Journal of Project Management	Qualitative	Multiple case studies (4)	Semi-structured interviews	Balance Balance
Aubert et al. (2015)	Journal of Strategic Information Systems	Theoretical			Tension Balance Paradox Duality Tension
Bisbe and Malagueño (2009)	European Accounting Review	Quantitative	Survey	Questionnaire to CEOs in 57 organizations	Balance Trade-offs Tension
Bisbe and Otley (2004)	Accounting, Organizations and Society	Quantitative	Survey	Questionnaire to CEOs in 58 organizations	Balance

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Brattström and Richtnér (2014)	Journal of Product Innovation Management	Qualitative	Multiple case studies (4)	Semi-structured interviews, plant tours, observation, project protocols	Tension Dialectic Dual objective Tension
Breunig et al. (2014)	Measuring Business Excellence	Qualitative	Multiple case studies (5)	Semi-structured interviews with managers, business developers, IT specialists	Balance Tension
Brühl et al. (2010)	European Journal of Innovation Management	Qualitative	Multiple case studies (8)	Interviews with managers	Balance Tension
Canonic and Söderlund (2010)	International Journal of Project Management	Qualitative	Multiple case studies (2)	Interviews, internal documents, officially released documents, observations	Balance Tension
Carter et al. (2013)	Journal of Business Strategies	Theoretical			Balance Trade-offs Tension Balance Paradox Dilemma Duality

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Chenhall and Morris (1995)	Omega	Quantitative	Survey	Questionnaire to managers in 72 organizations	Tension Balance Paradox Antithetical
Chenhall et al. (2011)	Journal of Management Accounting Research	Quantitative	Survey	Questionnaires to chief executive officers in 100 organizations	Tension
Davila (2000)	Accounting, Organizations and Society	Qualitative	Multiple case studies (12)	Interviews with project managers	Tension
Davila et al. (2009)	Accounting, Organizations and Society	Defined as Quantitative	Case survey (69)	Interviews and questionnaires to managers	Balance Paradox Tension
Ecker et al. (2013)	Journal of Management	Quantitative	Survey	Questionnaire to R&D unit managers in 123 organizations (MNCs)	Balance Trade-off
Eldridge et al. (2014)	International Journal of Quality and Reliability Management	Qualitative	Single case study	Semi-structured interviews with managers	Tension
Frow et al. (2005)	Management Accounting	Qualitative	Single case study	Interviews	Balance Tension Balance

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Goodale et al. (2011)	Journal of Operations Management	Quantitative	Survey	Questionnaire, 177 organizations	Tension Balance Antithetical Balance
Harris et al. (2009)	Information Systems Research	Qualitative	Multiple case studies (2)	Exploratory focus group and structured interviews	Trade-off Tension
Henri (2006)	Accounting, Organizations and Society	Quantitative	Survey	Questionnaire, 383 organizations	Paradox Dilemma Dialectic
Hodgson and Briand (2013)	Work, employment and society	Qualitative	Single case study of one project	Interviews and non-participating observations	Tension Balance Dialectic Antithesis
Jeacle and Carter (2012)	Accounting, Auditing and Accountability Journal	Qualitative	Single case study	Semi-structured interviews	Tension Balance Dilemma Dialectic

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Jørgensen and Messner (2010)	Accounting, Organizations and Society	Qualitative	Single case study	Interviews, archival documents and participant observation	Balance
Khazanchi et al. (2007)	Journal of Operations Management	Quantitative	Survey	Questionnaire to 110 plant managers	Trade-off Tension
Kivisaari (1991)	Scandinavian Journal of Management	Qualitative	Single case study	In-depth interviews (18) and company documents	Paradox Trade-offs Tension
Knardal and Pettersen (2015)	International Journal of Managing Projects in Business	Qualitative	Single case study in a festival organization	Semi-structured interviews and archival documents	Balance Trade-offs Dilemmas Tension
Kruis et al. (2015)	Management Accounting Research	Quantitative	Survey	Questionnaire to 217 managers	Balance Dilemma Tension
					Balance Trade-offs

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Theule and Fronda (2005)	Critical Perspectives on Accounting	Theoretical			Tension
Li et al. (2006)	Industrial Marketing Management	Quantitative	Survey	Questionnaire to 585 CEOs	Balance Paradox Dialectic Balance
Massaro et al. (2012)	Electronic Journal of Knowledge Management	Qualitative	Multiple case studies (3)	Interviews, public sources and internal reports	Tension
McCarthy and Gordon (2011)	R and D Management	Qualitative	Multiple case studies (15)	Semi-structured interviews and follow up interviews	Tension
Mouritsen et al. (2009)	Accounting, Organizations and Society	Qualitative	Multiple case studies (3)	Semi-structured interviews based on a questionnaire	Balance Dilemma Tension
Mundy (2010)	Accounting, Organizations and Society	Qualitative	Single case study	Semi-structured interviews, archival documents	Dilemma Tension
Perez-Freije and Enkel (2007)	European Management Journal	Qualitative	Multiple case studies (12)	Interviews	Balance Tension
Poskela and Martinsuo (2009)	Journal of production Innovation Management	Quantitative	Survey	Questionnaire to 133 managers	Balance Dilemma Balance

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Prajogo and McDermott (2011)	International Journal of Operations and Production Management	Quantitative	Survey	Questionnaire to 194 managers	Balance
Päril (2014)	Baltic Journal of Management	Qualitative	Single case study	In depth semi-structured interviews and observations	Paradox Paradox
Revelino and Mouritsen (2009)	European Accounting Review	Qualitative	Single case study in a single innovation project	Interviews	Tension
Revelino and Mouritsen (2015)	Management Accounting Research	Qualitative	Single case study in one project	Interviews, participant observation, document analysis	Dialectic Dualism Tension
Sitaen and Williams (2009)	Accounting Research Journal	Theoretical			Paradox Dilemma Dualism Tension
Stewart (2014)	International Journal of Public Sector	Qualitative	Single case study in one innovation program	Interviews and archival documents	Tension Balance Trade-offs

Table 9 continued

References	Journal	Study approach	Study methodology	Data collection methods	Used tension-related terms
Verbeeten and Boons (2009)	European Management Journal	Quantitative	Survey	Questionnaire to 45 CFO or controllers	Tension Balance Trade-off Tension
Vlaar et al. (2007)	Group and Organization Management	Theoretical			Dialectic Duality
Vosselman and van der Meer-Kooistra (2009)	Accounting, Organizations and Society	Theoretical			
Ylinen and Gullkvist (2012)	European Accounting Review	Quantitative	Survey	Questionnaire to project managers	Tension Balance Tension
Ylinen and Gullkvist (2014)	Management Accounting Research	Quantitative	Survey	Questionnaire to project managers	Balance Tension Balance

8 Appendix 2

See Table 10.

Table 10 List of reviewed journal and number of analysed articles in each

Name of journal	No. of identified articles (n = 47)
Accounting, Auditing and Accountability Journal	1
Accounting, Organizations and Society	9
Accounting Research Journal	1
Baltic Journal of Management	1
Critical Perspectives on Accounting	1
Electronic Journal of Knowledge Management	1
European Accounting Review	3
European Journal of Innovation Management	1
European Management Journal	2
Group and Organization Management	1
Industrial Marketing Management	1
Information Systems Research	1
International Journal of Managing Projects in Business	1
International Journal of Operations and Production Management	1
International Journal of Quality and Reliability Management	2
International Journal of Project Management	1
International Journal of Public Sector Management	1
Journal of Business Strategies	1
Journal of Management	1
Journal of Management Accounting Research	1
Journal of Operations Management	2
Journal of Product Innovation Management	2
Journal of Strategic Information Systems	1
Management Accounting Research	4
Omega	1
Qualitative Research in Accounting and Management	1
R and D Management	1
Scandinavian Journal of Management	1
Work, Employment and Society	1

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