Scenario Planning as Organizational Intervention

An Integrative Framework and Future Research Directions

Balarezo, Jose; Nielsen, Bo Bernhard

Document Version
Accepted author manuscript

Published in:
Review of International Business and Strategy

DOI:
10.1108/RIBS-09-2016-0049

Publication date:
2017

License
Unspecified

Citation for published version (APA):
Balarezo, J., & Nielsen, B. B. (2017). Scenario Planning as Organizational Intervention: An Integrative Framework and Future Research Directions. *Review of International Business and Strategy*, *27*(1), 2-52. https://doi.org/10.1108/RIBS-09-2016-0049

Scenario Planning as Organizational Intervention: An Integrative Framework and Future Research Directions

Jose Balarezo and Bo Bernhard Nielsen

Journal article (Accepted manuscript)

CITE: Scenario Planning as Organizational Intervention : An Integrative Framework and Future Research Directions. / Balarezo, Jose; Nielsen, Bo Bernhard. In: *Review of International Business and Strategy*, Vol. 27, No. 1, 2017, p. 2-52.

DOI: 10.1108/RIBS-09-2016-0049

Scenario Planning as organizational intervention:

An integrative framework and future research directions

INTRODUCTION

Strategic renewal is considered necessary for the long-term survival and success in organizations (Agarwal and Helfat 2009); yet such strategic renewal is very difficult to achieve (Bettis and Prahalad 1995; Corner, Kinicki, and Keats 1994; Huff, Huff, and Thomas 1992; Tripsas and Gavetti 2000). Strategic Planning (SP) is thought to bring strategies more in tune with changing business environments due to its ability to improve learning (van der Heijden 2004; Schoemaker 1995), enhance sense making, remedy cognitive biases and challenge prevailing mindsets (van der Heijden 2005; Schoemaker 1993, 1995; Wack 1985a, 1985b), or devise better strategic options and thus aid decision making (Chermack 2004a; van der Heijden 2005; Wack 1985a, 1985b). Accordingly, the use of SP makes organizations better prepared for coping with the uncertainty inherent in the business environment (Wack 1985a), the very essence of strategy. SP works under the basic assumption that the future will not be constant or similar to the current business environment by questioning the deepest assumption about an organization's strategy - thus promoting strategic renewal. This is particularly important in international business, where the business environment is constantly changing and fraud with high levels of uncertainty and risk due to differences in economic, political, social, cultural and geographic conditions (Cuervo-Cazurra et al., 2016; Andersson et al., 2014).

The normative aspects in this literature are appealing and its potential benefits have been fleetingly recognized by the strategic management literature. For instance, research on dynamic capabilities, (Teece 2007) as well as organizational identity and learning (Brown and Starkey 2000) have briefly touched upon the potential benefits of SP. Yet, empirical evidence

supporting its individual and organizational outcomes is insufficient (Chermack and Nimon 2008; Glick Chermack, Luckel and Gauck 2012; Harries 2003; O'Keefe and Wright 2010) and potentially unreliable because of the anecdotal and subjective-based nature of self-reported practitioners' often-biased-accounts of their interventions (Hodgkinson and Healey 2008). Moreover, the literature is dominated by a relatively large number of publications focusing on "techniques" or "methodological approaches" for building scenarios, many of which are at odds with each other leading to methodological confusion (Varum and Melo 2010). Consequently, SP research can be described as "Populist Science" where practical relevance is high but theoretical and methodological rigor is low.

This study systematically reviews, integrates, and links the SP literature to other relevant streams with focus on theoretical, methodological, and empirical development. The review provides pertinent information of the processes and causal mechanisms underlying SP, thus facilitating scientific verification of its merits (Chermack 2005; Harries 2003; Hodgkinson and Healey 2008). Specifically, this study aims to: 1) synthetize and integrate the SP literature into a coherent theoretical framework; 2) offer a systems view of SP as a process, and 3) identify areas of debate and highlight priorities for future research. The proposed theoretical framework includes antecedents, processes, outcomes and moderating/mediating variables and solidifies the theoretical foundations of the SP literature to aid future empirical testing. This is in stark contrast to previous literature reviews that have organized the SP literature mainly by clustering the various techniques for developing scenarios in different ways (e.g., Bishop et al. 2007; Börjeson et al. 2006; Bradfield et al. 2005). Consequently, the ensuing state-of-the-art review arranges the SP studies according to processes, theoretical roots and empirical evidence in order to move the literature towards a "Pragmatic Science", where both relevance and methodological rigor are high (Anderson, Herriot, and Hodgkinson 2001).

The paper is organized as follows. A methodological section follows this introduction. The next section presents a conceptual theoretical framework for SP and discusses its components. Discussion of the main debate areas in need of future research follows and implications for theory and practice closes the study.

METHODOLOGY

An analytical review scheme is necessary for a systematical evaluation of the literature in a research field, and especially suited for evaluating contributions and discerning patterns from a widely different set of studies or domains (Ferreira et al., 2016; Ginsberg and Venkatraman 1985). Given the lack of a common conceptual framework in the SP literature and the virtual lack of large N empirical work, meta-analysis cannot be used for this research. Instead, a qualitative review is conducted.

We started with an electronic search drawing from the Science Citation Index Expanded (SCI-expanded) and the Social Science Citation Index (SSCI) databases. These two databases are widely used in social sciences and humanities due to their cross disciplinary coverage and archival depth. The databases were accessed through the Web of Knowledge platform in January 2016. Dates were not constrained hence the search included the widest possible range – from 1900 to December 2015 for the SCI-Expanded, and from 1956 to December 2015 for the SSCI. The search did not yield any record older than 1977. The search was restricted to articles in peer-reviewed journals to ensure validity (Podsakoff et al. 2005).

The key words used were “scenario planning”, “scenario thinking” and “scenario building”, which are commonly used in this literature (Varum and Melo 2010). The following 12 categories were selected: “management”, “economics”, “business”, “business finance”, “operations research management science”, “planning development”, “computer science interdisciplinary applications”, “sociology”, “psychology”, “applied psychology”, “psychology

multidisciplinary" and "multidisciplinary sciences". This search yielded 233 records. The increased availability of databases has raised questions related to the accuracy of research based only on one database due to the differences in journal coverage (Basu 2010). For example, research comparing the Scopus and Web of Knowledge databases has shown that using only one of these databases risks missing relevant research (Vieira and Gomes 2009), especially when the search is limited to smaller citing entities – i.e. journals, conference proceedings or institutions (Meho and Sugimoto 2009). Hence, to strengthen the validity, a secondary search was performed using the Scopus database. The parameters selected followed as closely as possible the search in the Web of Knowledge. This search yielded 332 articles. After a manual review and de-selection of duplicated results, the final raw number of articles used in this research was 409.

The 409 articles were subjected to a manual selection process to assess their contributions and were selected for final inclusion based on presence of: (1) theory (such as frameworks, mechanisms, antecedents, moderators, variables or boundary conditions); (2) empirical nature (quantitative or qualitative) and; (3) detailed case studies of SP or scenario intervention which could potentially increase our understanding of the variables and mechanisms at play. After review, 137 articles were included in this review (see Appendix 1). Two independent researcher's reviewed all articles and agreed upon their inclusion; any remaining discrepancies were resolved via discussion until we reached a consensus.

CONCEPTUAL FRAMEWORK FOR UNDERSTANDING SP

Building on the articles reviewed (see Appendix 1), we constructed a conceptual framework which integrates past and current research and represents a stylized understanding of the different constructs and mechanisms underpinning SP. Figure 1 illustrates this framework.

Insert Figure 1 about here

The framework advances previous theoretical attempts to synthesize the literature (Chermack 2004b, 2005; Chermack and Lynham 2002; Keough and Shanahan 2008) by identifying SP as a process. It emphasizes two antecedents, five processes, three main outcome categories, five main moderators and a mediator. This processual analysis (Pettigrew 1997) contributes to the SP literature by integrating relationships between antecedents, processes and outcomes which have previously been studied in isolation. The analysis also provides much needed theoretical foundations for SP to guide future empirical research (Burt and Chermack 2008; Walton 2008).

Two antecedents [Box 1] influence the process and outcomes. Environmental uncertainty is an antecedent under the assumption that the future will not be constant or similar to the current business environment thus supporting the need for SP. Conceptualizing SP as a recurrent process provides better understanding of prior strategy in addition of individual and organizational frames as the context for the following iteration. There are five processes [Box 2 and 5], starting with environmental scanning and culminating in active monitoring which influence, over time, individual and organizational level responses. Three main outcome categories are identified; cognitive and learning outcomes [Box 3], decision-making outcomes [Box 4], and performance outcomes [Box 6]. These outcomes are sequential, meaning that cognitive and learning outcomes are necessary for better decision-making and later organizational performance. In reaching these outcomes, SP moves progressively from the individual or group level (i.e., cognition) to the organizational level (e.g. strategic renewal). These processes and outcomes are moderated [Box 7] or mediated [Box 8] by several variables, as explained in detail below.

Antecedents

Increased environmental uncertainty and engrained individual or organizational mental models puts organizations at a disadvantaged position towards long-term strategic adaptation and survival. This combination creates the domain where SP operates in its quest for enhancing individual and organizational outcomes.

Environmental uncertainty. The importance of an organization's ability to match strategies to external changes has long been discussed in the strategic management literature (Daft, Sormunen, and Parks 1988; Eisenhardt and Martin 2000; Miller 1994). In a similar vein, the SP literature also acknowledges the importance for organizations to be in tune with their external environment; in fact much of the adoption of the method is attributed to heightened external uncertainty. For instance, Linneman and Klein (1983) studied the use of scenarios in US firms and found that its adoption increased substantially after a number of external shocks. Similarly, Malaska and colleagues (1984) surveyed 166 firms and found evidence that scenario analysis was associated with increased unpredictability of corporate environments. Kennedy and Avila (2013) reported on the highly volatile Brazil motor vehicle market and provided evidence of the value of SP under economic, political and market uncertainty. More recently, studies correlate adoption of SP with higher external uncertainty faced by decision makers (Ramirez, Van Der Heijden, and Selsky 2010; Sharma & Yang, 2015; Varum & Melo 2010). Hence, the literature establishes a positive relationship between increased environmental uncertainty and adoption of SP in search for strategic adaptation.

Individual and organizational mental models. The cognitive perspective of strategy making acknowledges the bounded rationality of individuals (Simon 1979) and the important role that cognition plays in strategic contexts (Hodgkinson and Maule 2002). Individuals have limited information-processing capabilities which make them prone to creating economic

tendencies – e.g. heuristics - and to process information under the filters created by core beliefs, cognitive categorizations and mental frames (Duhaime and Schwenk 1985; Hodgkinson 2003; Hogarth 1987; Reger and Palmer 1996; Walsh 1995). Therefore, the way individuals act is explained by past experiences and economizing on information-processing. These cognitive limitations might blind managers to important environmental changes and lead them to inaccurate interpretations and wrong decisions.

Scenario planning is believed to be an efficient organizational intervention in reducing these cognitive limitations. Good scenarios can challenge preconceptions through a deeper appreciation of the factors that could shape the future (Schoemaker 1995). Further, scenarios aim at enhancing sense-making capabilities (Wright 2005) and reduce individual bounded rationality by presenting vast amounts of relevant information easily accessible by memory, thus affecting individual mental frames (Chermack 2004a). According to van der Heijden, (2005), scenarios develop the ability in managers to interpret information from the environment differently and force them to "think the unthinkable". Therefore, cognitive benefits are prescribed by this literature under the assumption that individuals and organizations are unlikely to timely update their mental models in face of dynamic environments. Hence, mental models in individuals and organizations are antecedent to the process of SP.

Processes

Five main processes in SP are identified. The first is environmental scanning which provides input for scenario building. The output of scenario building is the scenarios themselves which then are disseminated throughout the organization. Active monitoring links current SP processes to future processes. Research on processes has mainly focused on two areas, scenario building techniques and the scenarios themselves, leaving many important features of SP, such as movements across and within levels and the effects of the process over time, unexplored.

Environmental scanning is an important input for scenario building, for example in the identification of key factors and driving forces in the company's external environment (van der Heijden 2005; Schoemaker 1993; Schwartz 1991; Wack 1985a). Therefore, the quality of information gathered from the scanning process will have a great influence on the ensuing scenarios built. However, the literature has paid little attention to the different biases that scanning is potentially vulnerable to. For instance, scanning can be detrimental for changing perceptions due to biases such as hindsight (Barnes 1984; Kuvaas 2002) or confirmation (Darley and Gross 1983), which predisposes individuals to look for information that confirms their initial beliefs rather than finding contradictory evidence. As noted by Dorner and Schaub (1994), most information-collection mistakes are due to preformed images of reality as people fail to look at the whole range of information. Instead, people focus on what is considered important from the viewpoint of their preconceived image of reality. Therefore, standard ways of scanning are likely to be oriented towards known events (Beck and Plowman 2009). Hence, although the SP literature acknowledges the importance of environmental scanning - and the effects of engrained mental models as antecedent - it does not recognize the potential biases that scanning brings into the process.

Scenario Building. This is the area within SP that has drawn most scholarly attention. The number of methodologies proposed for creating scenarios is large. Good overviews and classifications of different methodologies for scenario building are provided by several scholars (e.g., Bishop et al. 2007; Börjeson et al. 2006; Bradfield et al. 2005; Huss and Honton 1987; Schnaars 1987; Varum and Melo 2010). However, despite the noble attempts at synthesizing the literature, many methodologies are at odds with each other. Moreover, the literature offers no theoretical reasons or empirical evidence to explain why a particular methodology should be preferred over another.

Yet, the confusion is not only associated with the methodologies for creating scenarios but also with the construct definition. Scenarios, scenario building, scenario thinking, and scenario planning (SP) are often confused or used interchangeably. For instance, Miller and Waller (2003) defined SP as a "process for structured thinking in which stories are created that bring together factual data and human insight to create scenario plots exploring possible futures" (p. 95). By the same token, Alonso and Austin (2016) showed how forward thinking may influence innovative practices. However, according to van der Heijden (2005), SP should have an integrating focus where decisions and actions to implement strategies are part of the process. There is a clear difference in these two definitions; the first one is centered on creating scenarios, thus missing integration into strategy development or implementation as proposed by the second definition. As pointed out by Chermack and Lynham (2002), SP definitions are unclear about what the primary intentions of the process are. This not only confuses readers but also potentially misdirects researchers and practitioners in this field as it is often unclear whether a particular study is about scenario building, SP, or something else. The lack of precision on the construct definition is indeed a critical issue in this literature. Without clear construct definition, efforts to strengthen the theoretical foundations of SP and unearth its mechanisms are seriously undermined. Bishop et al. (2007) briefly addressed the misuse of the word "scenarios" as it is often used indiscriminately to refer to scenario development and SP. The authors suggested using the word SP only when referring to a "complete foresight study" which generally should include 6 steps (framing, scanning, forecasting, visioning, planning and acting). Scenario development should be used only in the context of creating or building the "stories about the future" (Bishop et al. 2007).

These limitations notwithstanding, this review defines SP as "an organizational intervention with the potential for improving strategic adaptation and renewal and identifies 4 building blocks frequently associated with building scenarios; 1) *predetermined elements*, or

driving forces pushing for inevitable outcomes, although the timing and impact of these outcomes are not yet known (Wack 1985a; Wack 1985b). The identification of these predetermined elements is central to SP projects (Burt 2006); 2) the *strategic conversation*, or "carefully thought out but loosely facilitated series of in-depth conversations for key decision makers throughout the organization" (Schwarz 1991, p. 221). The strategic conversation incorporates a wide range of unstructured thoughts and views used to create a common interpretation (van der Heijden 2005); 3) *consensus*, as scenario building is a legitimation device around key strategic issues challenging the organization (Schoemaker 1993), and 4) *thinking the unthinkable* which attempts to entice out-of-the-box thinking, often by the inclusion of "remarkable people" to better challenge institutionalized thinking and broaden views (van der Heijden 1997). The four constructs appear to combine quantitative and qualitative dimensions in developing the scenarios.

Interestingly, the literature generally has not reflected on further biases introduced during scenario building. For instance, research points to potential problems in large group settings (used in scenario building workshops) such as stereotyping, decreased ownership of ideas or unwillingness to express novel thoughts (Weick and Quinn 1999). This constitutes an important area for future research in the pursuit of a better understanding of the SP process.

Scenarios are a central element of SP. However, their ability to effectively stretch people's thinking or challenge firm's strategic decisions is increasingly being challenged. For instance, scenarios tend to be unimaginative, constrained to a standard range of possibilities, focused on current issues, predictable on their factors and theme selection, and prone to leaving uncertainties out of the analysis (Bacon 2012; van Notten, Sleegers, and van Asselt 2005; O'Brien 2004). Moreover, scenarios seem often to be misleading and ill-prepared to entice novel thinking or anticipate rare events (Goodwin and Wright 2010; Postma and Liebl 2005).

For instance, Bacon (2012) analyzed 13 different scenario-based studies regarding the "future of Russia" and found that in all cases the scenarios constructed were too close to each other and reduced to a standard set of futures, usually within the lines of best case, worst case, continuity, and regional variation. Similarly, van Notten et al. (2005) reviewed 22 scenario studies and found only half of them included discontinuities. Methodological choice, tendency to consider only attractive futures and avoid threatening ones, organizational resistance towards uncertainty, or assumptions that the future will not be meaningfully different from the present are some of the reasons for this trend (van Notten et al. 2005).

The evidence points to a problematic area of SP: the scenarios themselves. Despite the large number of proposed methodologies, scenarios remain unimaginative, similar to each other, or gravitating toward current, known trends. As such, scenarios are ineffective to accomplish their prime objective - challenging mental frames. Instead, the restrictive array of scenarios might reinforce current views and status quo (Wright and Goodwin 2009). Indeed, many companies in their approach to scenarios are simply quantifying the obvious (Wack 1985a). The response has been more methodologies for reducing these weaknesses. For instance, the combination of quantitative and qualitative dimensions (von der Gracht and Darkow 2010; Söderholm et al. 2011), use of fuzzy cognitive mapping (Amer, Jetter, and Daim 2011; Jetter and Schweinfort 2011), combination of different methodologies (Dammers 2010), or inclusion of different types of scenarios such as inconsistent, context, recombinant, or scenarios that highlight key vulnerabilities (Bryant and Lempert 2010; Muskat, Blackman, and Muskat 2013; Postma and Liebl 2005).

Rather than proposing further methodologies, a more fruitful line of research is to deepen our understanding of the mechanisms that drive the SP process towards its intended outcomes. Scenarios, and SP in general, are social processes involving individuals embedded in the

organizational context. As such, it is surprising that the literature has not sufficiently leveraged insight from psychology and social cognition on how to improve the effectiveness of scenarios.

Contextual sharing and disseminating. There is a lack of clarity on how the SP process transcends into the organizational level (Burt and Chermack 2008). The organizational learning literature provides insights on how information residing at individual (or team) level can reach organizational levels; for instance through dissemination (Flores et al. 2012) or embedding (institutionalizing) learning into organizational routines (or memory) reflected in strategy, structure, procedures, and systems (Crossan et al. 1999). Within the SP literature, the case study at Shell provides good evidence of how knowledge from scenarios moved from individuals into the organization at large, reflected in changes in strategy. The company engineered this dissemination process by asking their line managers how they would react to the different scenarios created (De Geus 1997; Wack 1985a).

However, transferring knowledge is not a simple task and requires cooperation and determination from both transmitter and receiver. For instance, research on information transfer among teams found that teams must make the necessary effort to translate the knowledge into meaningful realities and contexts for the recipient side (Bresman 2012). By the same token, organizational learning theory points to the critical role of language and motivation for effective learning to take place (Crossan et al. 1999). Though limited, a few examples exist within the SP literature in which the efforts to disseminate scenarios and make it context specific are clear (e.g., Cornelius et al. 2005; Moyer 1996; Wack 1985a). For instance, Wack (1985a) reported how after a series of failed attempts for SP to reach organizational level responses, scenarios presented to line managers evolved into "a tailor-made fit between the scenarios and their [line manager's] deepest concerns" (p 88). Thus, scenarios were tailored to the specific part of the organization they were meant to reach and organizationally embedded in order to facilitate organizational level learning. However, the few case studies that do focus on contextual sharing

and dissemination remain largely silent on the barriers and enablers that might restrict or allow learning from SP to move from the group level (e.g. scenario building workshops) into the organization at large. Consequently, further research looking into the transferring mechanisms and potential blockers of this transfer is needed.

Active monitoring and SP as continuous process. Some researchers understand SP as a continuous organizational process. For instance, SP needs to continuously bridge the organization with its external environments by fine-tuning strategies and their implementation. Hence, SP is a continuous learning process that enhances organizational responsiveness by actively monitoring the key uncertainties identified during the scenario process, tracking environmental changes, and having frequent exposure updates (Miller and Waller 2003). Yet many SP projects fail because there is no link between the scenarios and strategies; a lack of implementation which can only be remedied with time and practice (Wilson 2000). Consequently, SP acts as a trend following an alert mechanism where signposts are used as early warning indicators for flagging which scenario might be developing (Ramirez et al. 2013)

Furthermore, as input for scenario building, the quality of information gathered from active monitoring will greatly influence subsequent iterations. Due to the high uncertainty inherent in long term scenarios, these should be refined and adjusted regularly as a way to assist decision making. In other words, SP as a decision support mechanism must be a continuous, iterative process; not a one-time, episodic exercise (Burt and van der Heijden 2003; Heinonen and Lauttamäki 2012; Mahmoud et al. 2009; Sarpong 2011).

However, despite the very good reasons for understanding SP as a dynamic and continuous process, most of the literature implicitly characterizes SP as a demanding, one-time exercise frequently led or facilitated by external advisers. There is scant evidence of the long term effects or evolution of the process over time; inter-temporal or dynamic dimensions are

mostly ignored. This omission prevents a better understanding of how exactly SP reaches organizational level outcomes.

Outcomes

Improved cognition, learning, strategic decision making, and organizational performance are some of the intended outcomes of SP. However, empirical evidence linking SP to such benefits is rare. This section reviews the proposed individual and organizational outcomes against the findings in the literature.

Individual cognition. Change in individual cognition is a primary intended outcome of SP (Chermack 2004b; van der Heijden 2005; Schoemaker 1995; Wright 2005). SP fosters a constant level of attention with its continuous demand for awareness to the internal and external environment. This, in turn, facilitates better sensing and forces decision makers to contemplate different perspectives. However, little empirical evidence exists to support these claims. The best evidence for the effect of scenarios on individual mental models is provided by Schoemaker (1993) who conducted experiments on MBA students. The results showed how the use of scenarios expanded their thinking as confidence ranges were widened. Schoemaker (1993) argued that scenarios use exploitation of biases in human cognition as mechanisms to achieve their goals. More precisely, scenarios achieve mental changes by reducing biases such as overconfidence, anchoring or availability through exploiting the conjunction fallacy bias – the inclination to believe that a combination of events is more likely than a single one.

In addition to Schoemaker's experiment, only a few other studies were found to empirically test the effects of SP on individual cognition, although the findings are generally inconclusive. Glick and colleagues (2012) used a sample of 129 individuals involved in SP interventions in 10 different firms. Comparison pre and post-intervention revealed mild support for the process' ability to change some individual mental models; however, the results were

inconclusive due to lack of control groups and short time span between the surveys. Zegras and Rayle (2012) used surveys pre and post SP intervention and did not find evidence for SP's ability to change participants' perception or views. Sedor (2002) built on contributions from psychology; specifically from Koehler's (1991) argument that tasks requiring a hypothesis to be treated as true is "sufficient to increase confidence in the truth of that hypothesis". Accordingly, by being presented with a scenario, individuals momentarily assume it as true, incorrectly assigning a higher likelihood of such scenario becoming true in detriment to alternative ones. Sedor (2002) investigated the biasing effect of scenario-like presentations by management following disappointing financial results and found that scenario-like presentations create more optimistic forecasts in analyst's recommendations. This indicates that instead of correcting them, scenarios may potentially introduce further cognitive biases. Phadnis et al. (2015) conducted three field studies of the impact of scenarios on confidence in judgments on long-range investment decisions among field experts. Their results suggest that the use of multiple scenarios have no impact on field experts' confidence in their judgments; rather any change in judgment confidence was attributed to how well (or poorly) a particular investment fared in a given scenario. In summary, despite the wide advocacy of SP prowess on challenging and changing mental frames, the empirical evidence does not support this. Further research is needed to better understand the actual effects of scenarios on individual cognition.

Individual and organizational learning. The literature generally prescribes SP as an intervention that improves individual and organizational learning (Schoemaker 1995; Schwartz 1991; van der Heijden 2004; van der Heijden et al. 2002). According to Aligica (2005) scenarios create knowledge from two perspectives; (1) psychologically through its cognitive contributions meant to confront uncertainty, decompose complexity and de-bias human minds by reducing over-confidence; and (2) from an epistemic point of view, where scenarios increase the stock of knowledge by putting pieces of information together where a new configuration

that brings new knowledge about the actors and implications might emerge. Since scenarios come from a rational assessment, they create knowledge which is not factual or empirical, but conditional. Similarly, Kivijarvi and collegues (Kivijärvi et al. 2010) view scenarios as elements that enhance organizational knowledge by testing knowledge items against other items. According to Bodwell and Chermack (2010), SP can help to achieve organizational ambidexterity; the simultaneous pursuit of explorative and exploitative learning.

However, similar to individual cognition, empirical evidence for the relationship between SP and organizational learning is vague. Chermack and colleagues (2006) investigated empirically the link between SP and organizational level learning by analyzing the difference in individual responses pre and post SP interventions (3 months span) in a large educational institution in the US. The results appear to associate SP with increased perception of organizational learning; however, the sample set is composed of only 9 respondents thus diminishing the validity of the results. More recently, Chermack and Nimon (2013) studied 129 individuals in eight organizations and found SP activities to increase the perception of a learning organizational culture, however, to what extent individuals and/or organizations actually 'learned' was not assessed. Given the purported positive relationship between SP and organizational learning and renewal, more research is needed to ascertain precisely how and when (under what conditions) such relationships may occur.

Decision-making outcomes. Selection of strategies more in line with the (emerging) environment should follow cognitive and learning outcomes. Although better appreciation of the business environment or identification of possible developing trends is important, decisions and actions need to be implemented (van der Heijden, 2004). However, the extant literature provides inadequate guidance or empirical evidence for how SP aids strategic selection or enables strategic change (Hodgkinson and Wright 2002; Keough and Shanahan 2008).

The early SP literature proposed qualitative and quantitative approaches to strategy selection such as intuition, managerial knowledge, wind tunneling, qualitative correlations, option stock/holder matrix, SWOT methods, key-success-factor-matrix or TOWS matrix for debate stimulation (van der Heijden 2005; Schoemaker 1995, 1997; Weihrich 1993). However, such tools are typically too simplistic, inadequate, and fraught with a multitude of problems to provide real value in decision-making (Goodwin and Wright, 2001). Such tools suffer from lack of realism as they underestimate the complex decision-making process in face of many scenarios, different constraints, alternatives and objectives. Hence, SP is criticized for its underdeveloped strategic evaluations techniques which are unlikely to help in developing and implementing better strategic decisions (Eriksson and Weber 2008; Goodwin and Wright 2001; Lempert et al. 2006; Tapinos 2012; Wright, Cairns, and Goodwin 2009). Among the few studies to report changes in strategic decisions based on SP processes, Phadnis et al. (2015) concluded that field experts seems to prefer more flexible long-term investment options after using multiple scenarios.

Organizational Performance. Surprisingly, the relationship between SP and organizational performance has received relatively little attention (Chermack 2004b; Hodgkinson and Wright 2002; Keough and Shanahan 2008; Mietzner and Reger 2005; Varum and Melo 2010). Furthermore, increased performance is generally not mentioned as a necessary outcome for SP (Chermack and Lynham 2002), despite the large amount of resources typically devoted to it (Millett 2003; Mietzner and Reger 2005). This review only identified two studies empirically investigating the relationship between SP and organizational performance. Phelps and colleagues (2001) studied two different industries in the UK and found only mild support for improved financial performance resulting from SP. However, the results are tenuous at best due to the combination of uncontrolled variables and a small sample. Moreover, worse

performance was also reported on some non-financial parameters. Visser and Chermack (2009) interviewed top level managers from 9 companies (small and large) in different industries and found some evidence that SP contributes to firm performance. However, in addition to the small sample, the interview data was subject to self-reported bias and notable differences between the SP processes of the interviewed companies prevent meaningful comparisons. Thus, the empirical evidence does not support a positive relationship between SP and firm performance. This is perhaps not surprising considering the lack of support for a positive relationship between SP and its other intended outcomes – cognition and learning.

All in all, the literature on SP provides lots of examples of *intended* performance outcomes but very little concrete empirical evidence of such effects. This is a critical issue since the entire raison d'être for investing time and resources in SP processes is predicated on improved organizational performance. Future research must provide stronger evidence of individual and organizational level positive outcomes to validate the implementation of SP.

Moderators and mediator

Extant research has mostly focused on the process and content of SP rather than the pre-existing or boundary conditions necessary for its effectiveness (Wright et al. 2008). Theoretical or empirical studies pointing towards moderators or mediators in SP research are scarce. It seems to be an implicit assumption that SP can be used effectively in any context or firm without considerations of the internal capabilities or adequacy for the host institution. Building on evidence presented in single case studies, this review has identified several important variables with the potential to affect the relationship between SP and its outcomes. Although in many cases the authors did not explicitly discuss or label a variable as moderator or mediator, the context provided supports interpretations of the proposed variables as moderators or mediators.

Five moderators are identified; (1) organizational and industry characteristics; (2) anchoring and understanding; (3) power and politics; (4) the SP team; and (5) structured quantitative techniques. In addition, emotional responses are discussed as potential mediator.

Organizational and industry characteristics as moderator. The large amount of resources needed to perform SP is a potential limitation, especially for small and medium-sized enterprises. Scenarios are expensive and difficult to create and the intense level of involvement makes SP an activity for only the most financially solid companies (van der Heijden 2005; Wack, 1985a). Moreover, the method is time consuming and highly demanding on personnel, further limiting the adoption of the method (Mietzner & Reger 2005; Millett 2003).

Interestingly, much of the broad adoption and popularity of SP hinges on the successful implementation at Shell and its ability to identify environmental shifts (Cornelius et al. 2005; Wack 1985a, 1985b). However, a careful read of the implementation at Shell shows the large amounts of capital, human resources, data and analyses behind the process (Wack 1985a). Further, it took years and many iterations for SP at Shell to have a positive organizational impact. Given the sheer size and idiosyncratic nature of Shell, this brings to question the generalizability of this case to other firms. If anything, this points to unique circumstances possibly constraining the process outside companies with these characteristics (i.e., large in size, financially strong, experienced in dealing with uncertainty, and with an advanced analytics' team). Similarly, strong institutional settings and organizational willingness to experiment, absorb and use the knowledge gathered in the process also may affect SP's success (Volkery and Ribeiro 2009). Unless the organization and its leaders are ready for such challenges, the process is likely to fail. As noted by Mintzberg (1994), successful SP interventions might be an exception rather than a rule.

Industry characteristics also have the potential to affect SP interventions (Keough and Shanahan 2008). On their account of a failed intervention, Hodgkinson and Wright (2002) left open the possibility that their intervention might have been premature for an organization embedded in a slow moving industry characterized by incremental change and not used to questioning its core beliefs and processes. Moreover, Gordon (2011) argued that an organization's level of influence over the potential uncertainties that could shape its environment servers to make the distinction between using visionary (normative) and adaptive scenarios. If the potential level of influence is considerable, the former type of scenarios is recommended. However, if there are many forces over which the organization has no real influence, adaptive scenarios should be used (Gordon 2011). Since SP questions long held assumptions and accepts discontinuities, it might be more appropriate for companies embedded in highly dynamic environments whose management is used to discontinuities and revision of assumptions underpinning strategies.

The success of SP seems to be moderated by various internal and external factors such as resource availability (human and financial), time, institutional and industry characteristics, willingness to challenge strategies, and ability to influence external uncertainties.

Anchoring and understanding as moderator. Anchoring SP at the highest ranks of the organization (e.g. the upper echelons) is important to achieve organizational buy-in. Consequently, the SP team, stakeholders, and project sponsors should be anchored at the higher organizational ranks in order to facilitate SP (Goodwin and Wright 2001; van der Heijden 2005; Mobasheri et al. 1989; Schwartz 1991).

An unclear understanding of the purposes of the scenario intervention is noted as one of the main culprits for unsuccessful SP interventions (Burt and van der Heijden 2003, 2008). According to van der Heijden (2004), there are four reasons for using SP (sense making, anticipating future events, finding the optimal strategy, and adaptive learning). The author

observed most failures when firms tried to generate strategies out of stand-alone scenario interventions, which incidentally tend to produce unsurprising scenarios. Naturally, organizational outcomes are difficult to reach from a standalone intervention involving few actors. Thus, a clear understanding from the inception of the purpose along with buy-in and support from high levels in the organizations are regarded as important for the success of SP.

Power and politics as moderator. Broad participation and organizational representation, for instance during scenario building workshops, is recommended in the literature. However, inequalities within the participants in terms of hierarchy and political weight might influence the deliberations during scenario construction and marginalize some views (Hanssen, Johnstad, and Klausen 2009). Thus, instead of prompting social and cognitive openness, SP might provoke cognitive closure if powerful individuals exert their influence. For instance, influence of powerful individuals potentially renders SP vulnerable to be used for setting personal or political agendas (Volkery and Ribeiro 2009), to increase momentum of a topic (Eriksson and Weber 2008), or to modify the results to make them politically more palatable (Heinonen and Lauttamäki 2012). Similarly, the project sponsor should be open and inclusive, instead of being embedded in close networks or biased in pursuing her/his own agendas (Cairns et al. 2006). Personal interests might be served by selecting or presenting scenarios one way or another (Selin 2006). In this way, power and politics may present dilemmas as actions and allocations of resources are excluded from the SP process. Hence, powerful individuals have the potential to exert negative influences on SP; a key issue rarely discussed in the SP literature.

SP team - composition and positioning as moderator. Keough and Shanahan (2008) identified the SP team composition as vital for the success of the process, while at the same time pointing to the lack of guidance in the literature as to how the team members are to be selected or trained. Notably, Hodgkinson and Healey (2008) investigated in depth the SP team's composition and its role in stimulating cognitive outcomes. Leveraging from the field of social

psychology and personality, a series of propositions regarding the composition and design of the SP team were articulated with focus on 1) participant's sufficient background knowledge and perspectives to maximize the likelihood of effective group information processing; 2) ensuring adequate blend of personalities to entice cooperative teamwork and minimize conflicts, decision stress and future-focused anxiety, and; 3) avoid political or logistical factors that might derail the optimal configuration of the teams.

The critical importance of the core SP team is in full display in the account presented at Shell (Wack 1985a, 1985b). Despite many obstacles, the SP team at Shell persevered until successful organizational outcomes were reached. However, the success achieved by the Shell SP team should not be generalized to other contexts. This team was very skilled at their positions and trained in dealing with uncertainty. Moreover, as noted previously, the team was embedded in a financially strong and adept organization committed to change. Less experienced teams in different contexts might have reached a different outcome. More recently, Harris (2013) gave a brief account of some of the workings of the team involved in SP at the Western Electric Coordinating Council, however, no mentioning of the team composition or organizational positioning was given. Given the importance of the core SP team for developing, screening and presenting scenarios to top management, it is surprising how little academic attention its optimal composition or characteristics has drawn. This constitutes an area ripe for further studies.

Structured quantitative techniques as moderator. The review revealed a growing trend towards combining SP with more structured quantitative tools better prepared for assessing and selecting strategic options. The structured quantitative dimension is argued as necessary to overcome human limitations in dealing with complex systems such as: (1) focusing on few variables; (2) neglecting time lags; (3) being subject to biases; and (4) using heuristics, focusing on linear causality and overlooking feedback loops (Acar and Druckenmiller 2006; Jetter and

Schweinfort 2011). The aim of combining SP with quantitative techniques is to reduce the complexity of the decision making. For instance, the use of decomposition – re-composition in decision analysis, where the re-composition phase follows a formalized set of axioms, reduces decision-making biases by managers when faced with such complexity (Goodwin and Wright 2001; Kowalski et al. 2009). Specific techniques proposed in combination with SP include Multi Criteria Decision Analysis (e.g., Goodwin and Wright 2001; Stewart, French, and Rios 2013; Wright and Goodwin 2009) and real options thinking (e.g., Alessandri et al. 2004; Driouchi, Leseure, and Bennett 2009; Miller and Waller 2003).

In the absence of quantitative techniques more adept at following formalized axioms for strategic selection, SP is ill prepared to select strategic options and is prone to introduce further biases due to the complexity of the decision process. Hence the exploratory essence of the scenarios seems to be well supplemented by structured quantitative techniques, thus likely improving the overall strategic selection capabilities of SP.

Emotional responses as mediator. SP introduces more uncertainty in the decision-making process by avoiding prediction. Reaching a decision in face of different perspectives and dilemmas is likely to create anxiety for the decision makers. New information that conflicts with current assumptions forces individuals into unease, anxiety and active rejection of the new painful information (Hodgkinson and Healey 2011; Karlsson, Loewenstein, and Seppi 2009).

Within the SP literature, the role of emotions has been insufficiently addressed. Our review found only a few studies exploring the effects that emotions play in the process. MacKay and McKiernan (2010) identified 4 dysfunctional effects of scenarios: (1) creativity layered on fantasy, (2) heightened expectations and confusion, (3) pride and passion, and (4) lack of relation to everyday work. The authors argued these dysfunctional effects might render the SP neutral, distant, or irrelevant at best; and harmful at worst. Heightened expectations and confusion arise from the reevaluation of current reality due to new lenses that lead to stress and

frustration. Pride is triggered among senior executives as scenario building activities may challenge their strategy, validity, necessity or durability. Emotional responses are also present in the study presented by Hodgkinson and Wright (2002), where the SP process failed because it triggered defensive avoidance strategies by the participants as escape valve to cope with the high levels of decision stress. Similarly, O'Keefe and Wright (2010) described a scenario intervention that failed from the outset as the process raised doubts about already made decisions, potentially jeopardizing the work security of the individuals involved in these prior decisions, many of which were participants of the scenario building process. Thus, instead of openly discussing the firm's strategic direction, emotional considerations prevailed. As noted by Wright and colleagues (2008), SP interventions are likely to challenge and question prevailing mindsets thus bruising some egos in the process. On the other hand, a recent quantitative study by Chermack and colleagues (2015) found SP intervention to be positively associated with a creative organizational climate through feelings of freedom, trust, idea-time and play/humor, among other things. By the same token, Sankaran et al. (2014) showed the importance of emotions in driving scenario planning and building. Passion, emotions and power were deemed particularly important in the process.

Hence, emotional responses are important in SP as mediator to cognitive outcomes and strategic responses. Scenarios might trigger emotional responses such as anxiety, insecurity, pride and passion thereby causing certain topics, trends, or decisions to be marginalized. This likely hinders cognitive and learning outcomes, and may delay or effectively evade strategic decisions. Similarly, scenarios might also trigger detachment from the process thus further diminishing its effects. In this way, emotions triggered during the SP process might negate any positive cognitive outcomes and instead reinforce dated views. On the other hand, SP interventions may also facilitate trust, openness and freedom to experiment, which may be lead to a more creative organizational climate. Future research must delve deeper into emotions as

a mechanism through which SP interventions influence various individual and organizational outcomes.

CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH

This paper has examined the current state of the SP literature. Based on a comprehensive review, an integrative conceptual framework was created which embodies the different antecedent, process, and outcome variables affecting SP. The review reveals four underdeveloped areas in particular need of further research.

(1) Are scenarios effective cognitive devices or sources of biases?

An unclear yet vital issue is whether the scenarios, a central building block of SP, are at all effective in challenging views and enhancing individual and corporate perceptions. The empirical evidence seemingly does not support this argument. Rather, scenarios seem to be constraining mechanisms reinforcing potentially out-of-date views and introducing further biases. Scenarios are presenting similar, agreeable, consensual, preferred pictures of the future, with limited treatment of uncertainties or discontinuities (Bacon 2012; van Notten et al. 2005; O'Brien 2004). If companies in their approach to scenarios are quantifying the obvious (Wack 1985a), then SP seems unlikely to open mental frames and challenge existing assumptions.

Furthermore, in the event that scenarios are well constructed, novel and interesting, it is not clear if they are adequate in reducing biases. The empirical evidence is mixed. Some evidence suggests scenarios achieve mental changes by reducing biases such as overconfidence, anchoring or availability (Schoemaker 1993). However, there is also evidence that scenario-like presentations introduce the same biases – e.g. overconfidence or anchoring (Sedor 2002). Further empirical research is needed to clarify this central issue.

(2) The organizational context and influences on the SP process

The review revealed a contradiction in the SP literature. On one hand, it correctly identifies the need for organizations to renew their mental models in face of uncertain and dynamic environments. From this perspective, the SP is prescribed as an intervention capable of updating mental models and correcting limitations in information processing. On the other hand, the literature ignores how difficult it is to change those same mental frames (Bettis and Prahalad 1995; Corner et al. 1994; Hall 1984).

Importantly, the extant literature has not yet reflected on the variety of biases and constraints affecting the process due to its organizational embeddedness. For instance, in addition to strategic mental frames, organizational identity and organizational routines are elements that form the structure of organizational strategic cognition (Narayanan, Zane, and Kemmerer 2010). Organizational identity is the organizational member's collective understanding of central and relatively permanent features of the organization (Albert and Whetten 1985). Strong organizational identities might result in cognitive inertia (Hodgkinson 1997; Reger and Palmer 1996).

Research has rarely touched upon the effects of identity or routines on the SP process. It is not clear how the SP process, embedded within the organization, breaks free from such influences affecting individual and organizational cognition. For example, the first building block for scenario construction, the identification of predetermined elements, will be heavily influenced by the biases introduced during the environmental scanning due to the biased nature of scanning (Beck and Plowman 2009; Dorner and Schaub 1994; Kuvaas 2002). After some analysis, a "predetermined element" might be identified, but such an element is predetermined only to the extent that its relationships are internally consistent and fit current mental frames. As scenarios are built from identified non-paradoxical trends or simple dichotomies, they are

unlikely to be useful for exploring situations beyond past known boundaries and contexts, or anticipate rare events (Goodwin and Wright 2010; Postma and Liebl 2005).

Only a handful of papers within the SP literature discusses these potential biases and their effects on SP. For instance, Roubelat (2006) argued organizational structures are rarely adequate to challenge old paradigms, much less to propose alternative ones. Consensus and self-censure will tend to eliminate views that do not fit the current paradigm, especially if members are selected to represent certain parts of the organization. Elkington and Trisoglio (1996) studied the effects of organizational identity at Shell and concluded the scenarios created by the company were affected by features associated with the identity of multinationals at the time – e.g. individualism, hierarchy and lack of egalitarian perspectives. This made Shell miss obvious trends in their environment; for instance in relation to corporate social responsibility.

Similarly, the role of emotions as well as power and politics might affect SP. Certain topics, scenarios or decisions might be avoided due to the anxiety the process produces, or because certain topics might not be in the interest of powerful individuals involved in SP. Power as a moderator in SP opens up an interesting debate: the tension between SP being anchored at the higher levels of the organization - which is widely recommended in the literature - and the potential negative influences these individuals might exert into the process due to their powerful positions. The main argument for anchoring the process high in the organization is the need to have SP buy-in at the higher ranks as organizational action is presumed to converge at the top management level (Bettis and Prahalad 1995; Thomas, Clark, and Gioia 1993). Although in line with the "upper echelon" view of the importance of top management teams (TMT) in organizations (Hambrick and Mason 1984), this line of argument disregards the possible negative effects of such strong involvement. For example, executive managers tend to focus their attention on topics they deem most relevant while selectively ignoring other topics not thought important (Bogner and Barr 2000; Daft and Weick 1984). Furthermore, commitment

to status quo is a significant top management orientation (Hambrick, Geletkanycz, and Fredrickson 1993), which may limit interpretation adequacy and learning capabilities of organizations (Beck and Plowman 2009), or prevent the opportunity to make sense of a situation by organizational groups outside top management (Maitlis and Sonenshein 2010).

Within the SP literature, the negative effects of an uncooperative CEO on a SP intervention have been documented (Hodgkinson and Wright 2002). Therefore, contrarily to the established view of senior executives role in anchoring SP, there is also evidence such involvement may be detrimental. Presumably, a more cohesive TMT with longer tenure will have stronger mental frames and be more resistant to SP interventions, or exert negative influences on the process as compared to younger, more diverse TMTs potentially more open to being challenged and exploring new alternatives (Nielsen and Nielsen, 2013). Yet, such questions have yet to be answered by empirical research. Better understanding of the TMT compositional characteristics and their effects on SP interventions seems ripe for further investigation.

Closely related to power and TMT influences is the issue of consensus vs. divergence. As pointed out by van der Heijden (2000), scenarios are effective only when the right balance between convergence and divergence of views is achieved. However, how exactly this consensus is achieved remains unclear. If consensus is influenced by power, then it is potentially detrimental to SP. When "groupthink" or consensus dominates, non-conforming views are discouraged or marginalized, which narrows the concerns and capabilities of organizations (Janis and Mann 1977; Miller 1993). As the power of the dominant coalition generally maintains particular worldviews, norms or traditions, it is of paramount importance in SP interventions to neutralize these influences. Consequently, further research pointing to mechanisms that balance out this power may be of particular value.

In sum, the literature pays insufficient attention to the embeddedness of the SP process and the potential constraining effects that organizational identity, routines, emotions, and power and politics might exert. Future research is encouraged to investigate such organizational effects and identify ways to prevent them from negatively influencing the SP process.

(3) SP team composition, function and positioning

The SP team has the potential to balance some of the negative organizational influences and is key in SP reaching successful organizational outcomes (Wack 1985a). However, research on the SP team is scarce and questions about its composition, function and positioning remain unanswered. For instance, should the SP team be a cross-functional team? In which part of the organization should the team be anchored? To whom should they report – e.g. organizational positioning? What are the optimal backgrounds, experiences, and personalities of the members? Based on which criteria should the SP team select participants for scenario building workshops?

Specifically, future research should clarify what is the purpose of the SP team? If it is only to facilitate SP interventions, then it is unlikely that SP will have positive effects as facilitation will likely converge into the views and needs of key stakeholders. Rather, the main task or mandate of the SP's team should be to challenge and ask the difficult questions that managers or key stakeholders do not want to ask or hear. However, this is likely to trigger emotional responses or face political pressures which creates the next pressing need for research about the SP team, namely positioning. It is important to identify mechanisms to shield this team from these social and political influences. Changing the reporting line from the upper echelon tiers of the organization to the Board of Directors may help minimize some of the political influences. Lastly, the internal composition of this team is in need of further investigation. For instance, the cultural backgrounds of the participants have the potential to affects the outcomes of the process (Barbanente, Khakee, and Puglisi 2002; Johnston 2001).

The work by Hodgkinson and Healey (2008) on SP team composition is an important first step in this direction, however, more research, for instance grounded in social identity theory (Turner and Oakes 1986) or human personality (Digman 1990) seems fruitful.

(4) SP learning flows - from the individual to the organization

A largely under-researched area was found in the mechanisms that move SP learning from the individual to the organization at large. The literature mainly speaks to the individual or group level; for example the people participating in the scenario building sessions. But how knowledge flows to other individuals within the organization (both laterally and vertically) is poorly understood. It appears that, similar to models for organizational learning or sense making, SP reaches the organization at large through the dissemination of the different scenarios and the sense-giving process of making the implications of such scenarios context-specific for the recipients. It is only gradually that the learning from SP is transmitted from individual to group and organizational levels.

Oddly, most of the extant literature focuses on externally driven stand-alone interventions. Conceptually, these single interventions resemble what change and intervention theory calls episodic change (Weick and Quinn 1999). Episodic change occurs when a change agent deliberately establishes conditions and circumstances that are different from what they are now (i.e., scenarios). This is accomplished through a series of actions or interventions either singularly or in collaboration with other people, such as external consultants, the SP team, scenario building workshops etc. (Ford and Ford 1994). Episodic change follows the freeze-transition-refreeze sequence and although people are highly motivated to learn during the transition stage, it is difficult to unfreeze patterns and relapse to previous patterns is likely (Weick and Quinn 1999). Furthermore, research on individual change behavior indicates that people exposed to interventions are normally at one of the following stages: pre-contemplation,

contemplation, action or maintenance (Prochaska, DiClemente, and Norcross 1992). These steps follow a spiral-like pattern with successive relapses to previous stages before action is taken. To this end, Beer and Eisenstat (1996) illustrated how difficult it is to achieve individual and organizational change from episodic interventions. Yet, most of the anecdotal evidence is from self-reported, single interventions and future studies must validate such findings in large-scale, multi-intervention research designs.

SP seems better conceptualized in line with intervention theory for continuous change which entails constant learning (Weick and Quinn 1999). An attitude towards continuous learning and adaptation must be institutionalized. In this way, feedback loops can be established. Learning from prior SP processes informs subsequent iterations leading, over time, to change and adaptation. Given the learning benefits attributed to SP, organizational learning theory offers a particularly promising conceptual lens for theoretically grounding SP. Yet surprisingly, few studies have empirically explored this possibility (Chermack et al. 2006). By the same token, because SP spans individual, group and organizational level of analysis, it is multilevel in nature. Hence, SP research will greatly benefit from detailed accounts of the evolution of the process over time, the interactions across levels, and the mechanisms that potentially facilitate or preclude SP from impacting organizational outcomes. Multilevel research may add value in uncovering the mechanisms that move knowledge and learning via SP from the individual to the organizational level.

The four research areas, accompanied by specific research questions and potential theoretical lenses, are summarized in Table 1.

Insert Table 1 about here

Scenario planning remains an important yet academically understudied strategic intervention technique utilized by many firm; particularly multinational firms faced with ever-changing conditions in their external environment. This study contributes to research by offering a coherent and consistent framework for understanding SP as a dynamic process. The framework provides structure to a disorganized normative literature by specifying the antecedents, processes and outcomes relevant to the SP process. As such, it offers future researchers with a systematic way to ascertain where a particular study may be located in the SP process and, importantly, how it may influence – or be influenced by – various factors in the process. The ensuring research questions provide precise guidelines to future scholars pursuing research on SP.

REFERENCES

Acar W, Druckenmiller D. (2006). Endowing cognitive mapping with computational properties for strategic analysis. *Futures* **38**(8): 993–1009.

Agarwal R, Helfat CE. (2009). Strategic Renewal of Organizations. *Organization Science* **20**(2): 281–293.

Albert S, Whetten D. (1985). Organizational Identity. *Research in Organizational Behavior* **7**: 263–295.

Alessandri TM, Ford DN, Lander DM, Leggio KB, Taylor M. (2004). Managing risk and uncertainty in complex capital projects. *The Quarterly Review of Economics and Finance* **44**(5): 751–767.

Aligica PD. (2005). Scenarios and the growth of knowledge: Notes on the epistemic element in scenario building. *Technological Forecasting and Social Change* **72**(7): 815–824.

Alonso, A.D., Austin, I.P. (2016) "I see the future": Associations between innovation and resources in the case of an exporting Western Australian regional family firm, *Review of International Business and Strategy* **26**(3): 314 - 333.

Amer M, Jetter A, Daim T. (2011). Development of fuzzy cognitive map (FCM)-based scenarios for wind energy. *International Journal of Energy Sector Management* **5**(4): 564–584.

Anderson N, Herriot P, Hodgkinson GP. (2001). The practitioner-research divide in Industrial, Work and Organizational (IWO) psychology: Where are we now, and were do we go from here. *Journal of Occupational and Organizational Psychology* **74**(4): 391–411.

Andersson, U., Cuervo-Cazurra, A., & Nielsen, B. B. (2014). From the editors: Explaining interaction effects within and across levels of analysis. *Journal of International Business Studies*, **45**(9), 1063-1071.

Bacon E. (2012). Writing Russia's Future: Paradigms, Drivers, and Scenarios. *Europe-Asia Studies* **64**(7): 1165–1189.

Barbanente A, Khakee A, Puglisi M. (2002). Scenario building for metropolitan Tunis. *Futures* **34**(7): 583–596.

Barnes JH. (1984). Cognitive biases and their impact on strategic planning. *Strategic Management Journal* **5**(2): 129–137.

Basu A. (2010). Does a country's scientific 'productivity'depend critically on the number of country journals indexed? *Scientometrics* **82**(3): 507–516.

Beck TE, Plowman DA. (2009). Experiencing Rare and Unusual Events Richly: The Role of Middle Managers in Animating and Guiding Organizational Interpretation. *Organization Science* **20**(5): 909–924.

Beer M, Eisenstat Russell A. (1996). Developing an Organization Capable of Implementing Strategy and Learning. *Human Relations* **49**(5): 597–619.

Bettis RA, Prahalad CK. (1995). The dominant logic: Retrospective and extension. *Strategic Management Journal* **16**(1): 5–14.

Bishop, Hines, Collins. (2007). The current state of scenario development: an overview of techniques. *foresight* **9**: 5–25.

Bodwell W, Chermack TJ. (2010). Organizational ambidexterity: Integrating deliberate and emergent strategy with scenario planning. *Technological Forecasting and Social Change* **77**(2): 193–202.

Bogner WC, Barr PS. (2000). Making sense in hypercompetitive environments: A cognitive explanation for the persistence of high velocity competition. *Organization Science* **11**(2): 212–226.

Börjeson L, Höjer M, Dreborg K-H, Ekvall T, Finnveden G. (2006). Scenario types and techniques: Towards a user's guide. *Futures* **38**(7): 723–739.

Bradfield R, Wright G, Burt G, Cairns G, van der Heijden K. (2005). The origins and evolution of scenario techniques in long range business planning. *Futures* **37**(8): 795–812.

Bresman H. (2012). Changing Routines: A Process Model of Vicarious Group Learning in Pharmaceutical R&D. *Academy of Management Journal* **56**(1): 35–61.

Brown AD, Starkey K. (2000). Organizational Identity and Learning: A Psychodynamic Perspective. *The Academy of Management Review* **25**(1): 102.

Bryant BP, Lempert RJ. (2010). Thinking inside the box: A participatory, computer-assisted approach to scenario discovery. *Technological Forecasting and Social Change* **77**(1): 34–49.

Burt G. (2006). Pre-determined elements in the business environment: Reflecting on the legacy of Pierre Wack. *Futures* **38**(7): 830–840.

Burt G, Chermack T. (2008). Learning With Scenarios: Summary and Critical Issues. *Advances in Developing Human Resources* **10**(2): 285–295.

Burt G, van der Heijden K. (2003). First steps: towards purposeful activities in scenario thinking and future studies. *Futures* **35**(10): 1011–1026.

Burt G, van der Heijden K. (2008). Towards a framework to understand purpose in Futures Studies: The role of Vickers' Appreciative System. *Technological Forecasting and Social Change* **75**(8): 1109–1127.

Cagnin, C., & Könnölä, T. (2014). Global foresight: Lessons from a scenario and roadmapping exercise on manufacturing systems. *Futures*, **59**: 27-38.

Cairns G, Wright G, Van der Heijden K, Bradfield R, Burt G. (2006). Enhancing foresight between multiple agencies: Issues in the use of scenario thinking to overcome fragmentation. *Futures* **38**(8): 1010–1025.

Chermack T. (2004a). Improving decision-making with scenario planning. *Futures* **36**(3): 295–309.

Chermack T. (2004b). A Theoretical Model of Scenario Planning. *Human Resource Development Review* **3**(4): 301–325.

Chermack T. (2005). Studying scenario planning: Theory, research suggestions, and hypotheses. *Technological Forecasting and Social Change* **72**(1): 59–73.

Chermack T, Bodwell W, Glick M. (2010). Two Strategies for Leveraging Teams Toward Organizational Effectiveness: Scenario Planning and Organizational Ambidexterity. *Advances in Developing Human Resources* **12**(1): 137–156.

Chermack, T. J., Coons, L. M., Nimon, K., Bradley, P., & Glick, M. B. (2015). The Effects of Scenario Planning on Participant Perceptions of Creative Organizational Climate. *Journal of Leadership & Organizational Studies*, **22**(3): 355-371.

Chermack T, Lynham S. (2002). Definitions and Outcome Variables of Scenario Planning. *Human Resource Development Review* **1**(3): 366–383.

Chermack T, Lynham S, van der Merwe L. (2006). Exploring the relationship between scenario planning and perceptions of learning organization characteristics. *Futures* **38**(7): 767–777.

Chermack T, Lynham S, Ruona W. (2001). A Review of Scenario Planning Literature. *Futures Research Quarterly* (Quarterly Summer 2001): 7–31.

Chermack TJ, Nimon K. (2008). The effects of scenario planning on participant decision-making style. *Human Resource Development Quarterly* **19**(4): 351–372.

Chermack, TJ., Nimon, K. (2013). Drivers and outcomes of scenario planning: a canonical correlation analysis. *European Journal of Training and Development*, **37**(9): 811-834.

Cornelius P, Van de Putte A, Romani M. (2005). Three decades of Scenario Planning in Shell. *California Management Review* **48**(1): 92–109.

Corner PD, Kinicki AJ, Keats BW. (1994). Integrating organizational and individual information processing perspectives on choice. *Organization Science* **5**(3): 294–308.

Cuervo-Cazurra, A., Andersson, U., Brannen, M. Y., Nielsen, B. B., & Reuber, A. R. (2016). From the Editors: Can I trust your findings? Ruling out alternative explanations in international business research. *Journal of International Business Studies* **47**(8): 881–897.

Daft RL, Sormunen J, Parks D. (1988). Chief executive scanning, environmental characteristics, and company performance: an empirical study. *Strategic Management Journal* **9**(2): 123–139.

Daft RL, Weick KE. (1984). Toward a model of organizations as interpretation systems. *Academy of management review* **9**(2): 284–295.

Dammers E. (2010). Making territorial scenarios for Europe. *Futures* **42**(8): 785–793.

Darley JM, Gross PH. 1983. A hypothesis-confirming bias in labeling effects. *Journal of Personality and Social Psychology* **44**(1): 20.

Digman JM. (1990). Personality structure: Emergence of the five-factor model. *Annual review of psychology* **41**(1): 417–440.

Dorner D, Schaub H. (1994). Errors in Planning and Decision-making and the Nature of Human Information Processing. *Applied Psychology* **43**(4): 433–453.

Driouchi T, Leseure M, Bennett D. (2009). A robustness framework for monitoring real options under uncertainty. *Omega* **37**(3): 698–710.

Duhaime IM, Schwenk CR. (1985). Conjectures on cognitive simplification in acquisition and divestment decision making. *Academy of Management Review* **10**(2): 287–295.

Eisenhardt K, Martin J. (2000). Dynamic capabilities: what are they? *Strategic Management Journal* **21**: 1105–1121.

Eisenhardt K, Zbaracki M. (1992). Strategic Decision Making. *Strategic management journal* **13**: 17–37.

Elkington J, Trisoglio A. (1996). Developing realistic scenarios for the environment: Lessons from Brent Spar. *Long Range Planning* **29**(6): 762–769.

Eriksson EA, Weber KM. (2008). Adaptive Foresight: Navigating the complex landscape of policy strategies. *Technological Forecasting and Social Change* **75**(4): 462–482.

Feldman MS. (2000). Organizational routines as a source of continuous change. *Organization science* **11**(6): 611–629.

Ferreira, J. J. M., Fernandes, C. I., & Ratten, V. (2016). A co-citation bibliometric analysis of strategic management research. *Scientometrics,* **109**(1): 1-32.

Flores LG, Zheng W, Rau D, Thomas CH. (2012). Organizational Learning: Subprocess Identification, Construct Validation, and an Empirical Test of Cultural Antecedents. *Journal of Management* **38**(2): 640–667.

Ford JD, Ford LW. (1994). Logics of Identity, Contradiction, and Attraction in Change. *The Academy of Management Review* **19**(4): 756.

De Geus A. (1997). *The Living Company*. Nicholas Brealey: London.

Ginsberg A, Venkatraman N. 1985. Contingency perspectives of organizational strategy: A critical review of the empirical research. *Academy of Management Review* : 421–434.

Glick MB, Chermack TJ, Luckel H, Gauck BQ. (2012). Effects of scenario planning on participant mental models. *European Journal of Training and Development* **36**(5): 488–507.

Goodwin P, Wright G. (2001). Enhancing strategy evaluation in scenario planning: a role for decision analysis. *Journal of Management Studies* **38**(1): 1–16.

Goodwin P, Wright G. (2010). The limits of forecasting methods in anticipating rare events. *Technological Forecasting and Social Change* **77**(3): 355–368.

Gordon A. (2011). The uses and limits of visionary scenarios: learning from the African experience. *foresight* **13**(4): 64–81.

Von der Gracht HA, Darkow I-L. (2010). Scenarios for the logistics services industry: A Delphi-based analysis for 2025. *International Journal of Production Economics* **127**(1): 46–59.

Hall R. (1984). The Natural Logic of Management Policy Making: Its Implications for the Survival of an Organization. *Management Science* **30**(8): 905–927.

Hambrick DC, Geletkanycz MA, Fredrickson JW. (1993). Top executive commitment to the status quo: Some tests of its determinants. *Strategic Management Journal* **14**(6): 401–418.

Hambrick DC, Mason PA. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of management review* : 193–206.

Hanssen GS, Johnstad T, Klausen JE. (2009). Regional Foresight, Modes of Governance and Democracy. *European Planning Studies* **17**(12): 1733–1750.

Harries C. 2003. Correspondence to what? Coherence to what? What is good scenario-based decision making? *Technological Forecasting and Social Change* **70**(8): 797–817.

Harris, G. (2013). A continuous-learning process that updates and enhances planning scenarios. *Strategy & Leadership*, **41**(3): 42-50.

Van der Heijden K. (1997). *Scenarios, strategies and the strategy process*. Nijenrode University Press: The Netherlands.

Van der Heijden K. (2000). Scenarios and forecasting: two perspectives. *Technological forecasting and social change* **65**(1): 31–36.

Van der Heijden K. (2004). Can internally generated futures accelerate organizational learning? *Futures* **36**(2): 145–159.

Van der Heijden K. (2005). *Scenarios: The Art of Strategic Conversation*, Second. John Wiley & Sons.

Heinonen S, Lauttamäki V. (2012). Backcasting scenarios for Finland 2050 of low emissions. *foresight* **14**(4): 304–315.

Hodgkinson G. (1997). The Cognitive Analysis of Competitive Structures: A Review and Critique. *Human Relations* **50**(6): 625–654.

Hodgkinson G. (2003). The interface of cognitive and industrial, work and organizational psychology. *Journal of Occupational and Organizational Psychology* **76**: 1–25.

Hodgkinson GP, Healey MP. (2008). Toward a (Pragmatic) Science of Strategic Intervention: Design Propositions for Scenario Planning. *Organization Studies* **29**(3): 435–457.

Hodgkinson GP, Healey MP. (2011). Psychological foundations of dynamic capabilities: reflexion and reflection in strategic management. *Strategic Management Journal* **32**(13): 1500–1516.

Hodgkinson GP, Maule AJ. (2002). Heuristics, biases and strategic decision making. *Psychologist* **15**: 68–71.

Hodgkinson GP, Maule AJ, Bown NJ, Pearman AD, Glaister KW. (2002). Further reflections on the elimination of framing bias in strategic decision making. *Strategic Management Journal* **23**(11): 1069–1076.

Hodgkinson GP, Wright G. (2002). Confronting strategic inertia in a top management team: Learning from failure. *Organization Studies* **23**(6): 949–977.

Hogarth RM. (1987). *Judgment and choice: The psychology of decision*, 2nd ed. John Wiley & Sons: Oxford, England.

Huff JO, Huff AS, Thomas H. (1992). Strategic renewal and the interaction of cumulative stress and inertia. *Strategic Management Journal* **13**(S1): 55–75.

Huss W, Honton E. (1987). Scenario Planning, what style should you use? *Long Range Planning* **20**(No 4): 21 to 29.

Janis IL, Mann L. (1977). *Decision making: A psychological analysis of conflict, choice and commitment*. Free Press: New York.

Jetter A, Schweinfort W. (2011). Building scenarios with Fuzzy Cognitive Maps: An exploratory study of solar energy. *Futures* **43**(1): 52–66.

Johnston R. (2001). Foresight-refining the process. *International Journal of Technology Management* **21**(7): 711–725.

Karlsson N, Loewenstein G, Seppi D. (2009). The ostrich effect: Selective attention to information. *Journal of Risk and Uncertainty* **38**(2): 95–115.

Kennedy, P. J., & Avila, R. J. (2013). Decision making under extreme uncertainty: blending quantitative modeling and scenario planning. *Strategy & Leadership*, **41**(4): 30-36.

Keough SM, Shanahan KJ. (2008). Scenario Planning: Toward a More Complete Model for Practice. *Advances in Developing Human Resources* **10**(2): 166–178.

Kivijärvi H, Piirainen K, Tuominen M. (2010). Sustaining organizational innovativeness: Advancing knowledge sharing during the scenario process. *International Journal of Knowledge Management (IJKM)* **6**(2): 22–39.

Koehler D. (1991). Explanation, Imagination, and Confidence in Judgment. *Psychological bulletin* **110**(3): 499–519.

Korte RF, Chermack TJ. (2007). Changing organizational culture with scenario planning. *Futures* **39**(6): 645–656.

Kowalski K, Stagl S, Madlener R, Omann I. 2009. Sustainable energy futures: Methodological challenges in combining scenarios and participatory multi-criteria analysis. *European Journal of Operational Research* **197**(3): 1063–1074.

Kuvaas B. (2002). An exploration of two competing perspectives on informational contexts in top management strategic issue interpretation. *Journal of Management Studies* **39**(7): 977–1001.

Lempert RJ, Groves DG, Popper SW, Bankes SC. (2006). A general, analytic method for generating robust strategies and narrative scenarios. *Management Science* **52**(4): 514–528.

Linneman RE, Klein HE. (1983). The use of multiple scenarios by US industrial companies: A comparison study, 1977–1981. *Long Range Planning* **16**(6): 94–101.

MacKay B, McKiernan P. (2010). Creativity and dysfunction in strategic processes: The case of scenario planning. *Futures* **42**(4): 271–281.

Mahmoud M, Liu Y, Hartman, H, Stewart, S, Wagener, T, Semmens, D, Stewart, R, Winter, L. (2009). A formal framework for scenario development in support of environmental decision-making. *Environmental Modelling & Software* **24**(7): 798–808.

Mahmud, J. (2011). City foresight and development planning case study: Implementation of scenario planning in formulation of the Bulungan development plan. *Futures*, **43**(7): 697-706.

Maitlis S, Sonenshein S. (2010). Sensemaking in Crisis and Change: Inspiration and Insights From Weick (1988). *Journal of Management Studies* **47**(3): 551–580.

Malaska P, Malmivirta M, Hansen S-O. (1984). Scenarios in Europe - Who uses them and why? *Long Range Planning* **17**(5): 45–49.

McWhorter, R. R., & Lynham, S. A. (2014). An initial conceptualization of virtual scenario planning. *Advances in Developing Human Resources*, **16**(3): 335-355.

Meho LI, Sugimoto CR. (2009). Assessing the scholarly impact of information studies: A tale of two citation databases—Scopus and Web of Science. *Journal of the American Society for Information Science and Technology* **60**(12): 2499–2508.

Mietzner D, Reger G. (2005). Advantages and disadvantages of scenario approaches for strategic foresight. *International Journal of Technology Intelligence and Planning* **1**(2): 220–239.

Miller D. (1993). The architecture of simplicity. *Academy of Management review* **18**(1): 116–138.

Miller D. (1994). What happens after success: The perils of excellence. *Journal of Management Studies* **31**(3): 325–358.

Miller KD, Waller HG. (2003). Scenarios, real options and integrated risk management. *Long Range Planning* **36**(1): 93–107.

Millett SM. (2003). The future of scenarios: challenges and opportunities. *Strategy & Leadership* **31**(2): 16–24.

intzberg H. (1994). *Rise and Fall of Strategic Planning*. Prentice Hall: London.

Mobasheri F, Orren L, Sioshansi F. (1989). Senario Planning at Southern California Edison. *Interfaces* **19**(5): 31–44.

Moyer K. (1996). Scenario planning at British Airways–A case study. *Long Range Planning* **29**(2): 172–181.

Muskat M, Blackman D, Muskat B. (2013). Mixed Methods: Combining Expert Interviews, Cross-Impact Analysis and Scenario Development. *Cross-Impact Analysis and Scenario Development (January 17, 2013)*.

Narayanan VK, Zane LJ, Kemmerer B. (2010). The Cognitive Perspective in Strategy: An Integrative Review. *Journal of Management* **37**(1): 305–351.

Nielsen, B. B., & Nielsen, S. (2013). Top management team nationality diversity and firm performance: A multilevel study. *Strategic Management Journal*, **34**(3): 373-382.

Van Notten PWF, Sleegers AM, van Asselt MBA. (2005). The future shocks: On discontinuity and scenario development. *Technological Forecasting and Social Change* **72**(2): 175–194.

O'Brien FA. (2004). Scenario planning—-lessons for practice from teaching and learning. *European Journal of Operational Research* **152**(3): 709–722.

O'Keefe M, Wright G. (2010). Non-receptive organizational contexts and scenario planning interventions: A demonstration of inertia in the strategic decision-making of a CEO, despite strong pressure for a change. *Futures* **42**(1): 26–41.

Pettigrew AM. (1997). What is a processual analysis? *Scandinavian Journal of Management* **13**: 337–348.

Phadnis, S., Caplice, C., Sheffi, Y., & Singh, M. (2015). Effect of scenario planning on field experts' judgment of long-range investment decisions. *Strategic Management Journal*, forthcoming.

Phelps R, Chan C, Kapsalis S. (2001). Does scenario planning affect performance? Two exploratory studies. *Journal of Business Research* **51**(3): 223–232.

Podsakoff PM, Mackenzie SB, Bachrach DG, Podsakoff NP. (2005). The influence of management journals in the 1980s and 1990s. *Strategic Management Journal* **26**(5): 473–488.

Postma TJBM, Liebl F. (2005). How to improve scenario analysis as a strategic management tool? *Technological Forecasting and Social Change* **72**(2): 161–173.

Prochaska JO, DiClemente CC, Norcross JC. (1992). In search of how people change: Applications to addictive behaviors. *American psychologist* **47**(9): 1102.

Ramirez R, Van Der Heijden K, Selsky J (eds). (2010). *Business planning for turbulent times.* Earthscan: Abingdon, England.

Ramirez R, Österman R, Grönquist D. (2013). Scenarios and early warnings as dynamic capabilities to frame managerial attention. *Technological Forecasting and Social Change* **80**(4): 825–838.

Reger RK, Palmer TB. (1996). Managerial categorization of competitors: Using old maps to navigate new environments. *Organization Science* **7**(1): 22–39.

Roubelat F. (2006). Scenarios to challenge strategic paradigms: Lessons from 2025. *Futures* **38**(5): 519–527.

Sankaran, S., Dick, B., Shaw, K., Cartwright, C., Davies, A., Kelly, J., & Vindin, B. (2014). Application of Scenario-based Approaches in Leadership Research: An

Action Research Intervention as Three Sets of Interlinked Practices. *Systemic Practice and Action Research*, **27**(6): 551-573.

Sarpong D. (2011). Towards a methodological approach: theorising scenario thinking as a social practice. *foresight* **13**(2): 4–17.

Schnaars SP. (1987). How to develop and use scenarios. *Long range planning* **20**(1): 105–114.

Schoemaker P. (1993). Multiple scenario development: Its conceptual and behavioral foundation. *Strategic Management Journal* **14**(3): 193–213.

Schoemaker P. (1995). Scenario Planning: A tool for Strategic Thinking. *Sloan Management Review* **Winter**(36, 2).

Schoemaker P. (1997). Disciplined imagination: from scenarios to strategic options. *International Studies of Management & Organization* **27**(2): 43–70.

Schwartz P. (1991). *The Art of the Long View*. Doubleday: New York.

Sedor LM. (2002). An explanation for unintentional optimism in analysts' earnings forecasts. *The Accounting Review* **77**(4): 731–753.

Selin C. (2006). Trust and the illusive force of scenarios. *Futures* **38**(1): 1–14.

Sharma, R. S., & Yang, Y. (2015). A Hybrid Scenario Planning Methodology for Interactive Digital Media. *Long Range Planning*, **48**(6): 412-429.

Simon H. (1979). Rational Decision Making in Business Organizations. *The American Economic Review* **69**(4): 493–513.

Söderholm P, Hildingsson R, Johansson B, Khan J, Wilhelmsson F. (2011). Governing the transition to low-carbon futures: A critical survey of energy scenarios for 2050. *Futures* **43**(10): 1105–1116.

Song Y, Ding C, Knaap G. (2006). Envisioning Beijing 2020 through sketches of urban scenarios. *Habitat International* **30**(4): 1018–1034.

Stepchenko, D., Voronova, I. (2014). Scenario Planning Role: Case Baltic Non-Life Insurance Market. *Economics and Management* **19**(1): 36-43.

Stewart TJ, French S, Rios J. (2013). Integrating multicriteria decision analysis and scenario planning—Review and extension. *Omega* **41**(4): 679–688.

Tapinos E. (2012). Perceived Environmental Uncertainty in scenario planning. *Futures* **44**(4): 338–345.

Teece DJ. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal* **28**(13): 1319–1350.

Teece DJ, Pisano G, Shuen A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal* **18**(7): 509–533.

Thomas JB, Clark SM, Gioia DA. (1993). Strategic sensemaking and organizational performance: Linkages among scanning, interpretation, action, and outcomes. *Academy of management Journal* **36**(2): 239–270.

Tripsas M, Gavetti G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic management journal* **21**(10-11): 1147–1161.

Turner JC, Oakes PJ. (1986). The significance of the social identity concept for social psychology with reference to individualism, interactionism and social influence. *British Journal of Social Psychology* **25**(3): 237–252.

Varum CA, Melo C. (2010). Directions in scenario planning literature-A review of the past decades. *Futures* **42**(4): 355–369.

Vainauskiene, V., & Vaitkiene, R. (2013). Integration of brand vulnerability scenarios planning into brand management process. *Economics and management*, **18**(3): 553-561.

Vieira ES, Gomes JANF. (2009). A comparison of Scopus and Web of Science for a typical university. *Scientometrics* **81**(2): 587–600.

Visser M, Chermack T. (2009). Perceptions of the relationship between scenario planning and firm performance.pdf. *Futures* (41): 581–592.

Volkery A, Ribeiro T. (2009). Scenario planning in public policy: Understanding use, impacts and the role of institutional context factors. *Technological Forecasting and Social Change* **76**(9): 1198–1207.

Wack P. (1985a). Scenarios: uncharted waters ahead. *Harvard Business Review* **September - October**: 73–89.

Wack P. (1985b). Shooting the rapids. *Harvard Business Review* **November - December**: 139 – 150.

Walsh J. (1995). Managerial and Organizational Cognition: Notes from a Trip Down Memory Lane. *Organization Science* **6**(3): 280–321.

Walton JS. (2008). Scanning Beyond the Horizon: Exploring the Ontological and Epistemological Basis for Scenario Planning. *Advances in Developing Human Resources* **10**(2): 147–165.

Weick KE, Quinn RE. (1999). Organizational change and development. *Annual review of psychology* **50**(1): 361–386.

Weihrich H. (1993). Daimler–Benz's move towards the next century. *European Business Review* **93**(1): 4–11.

Weng, W. H., & Lin, W. T. (2015). A Mobile Computing Technology Foresight Study with Scenario Planning Approach. *International Journal of Electronic Commerce Studies*, **6**(2): 223-232.

Wilson I. (2000). From scenario thinking to strategic action. *Technological forecasting and social change* **65**(1): 23–29.

Wright A. (2005). The role of scenarios as prospective sensemaking devices. *Management Decision* **43**(1): 86–101.

Wright G, Cairns G, Goodwin P. (2009). Teaching scenario planning: Lessons from practice in academe and business. *European Journal of Operational Research* **194**(1): 323–335.

Wright G, Goodwin P. (2009). Decision making and planning under low levels of predictability: enhancing the scenario. *International Journal of Forecasting* **25**(4): 813–825.

Wright G, Van der Heijden K, Burt G, Bradfield R, Cairns G. (2008). Scenario planning interventions in organizations: An analysis of the causes of success and failure. *Futures* **40**(3): 218–236.

Zegras C, Rayle L. (2012). Testing the rhetoric: An approach to assess scenario planning's role as a catalyst for urban policy integration. *Futures* **44**(4): 303–318.

Figure 1

Integrative framework for SP

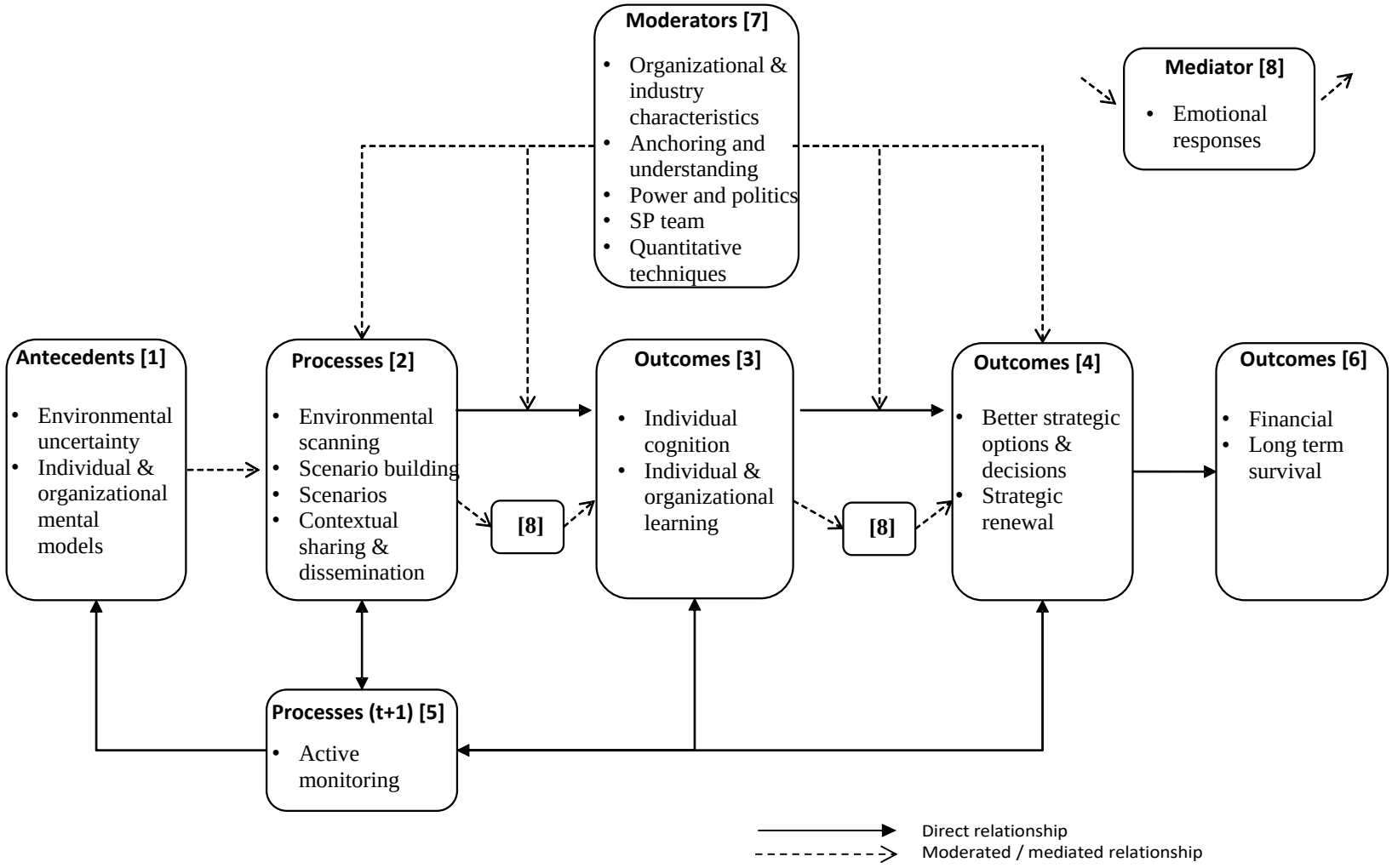

Table 1. Research agenda for SP

Research areas	Research questions	Theoretical lenses
Scenarios as effective cognitive devices or sources of bias	➢ What determines the quality of scenarios in terms of variety, novelty and treatment of discontinuities? ➢ What mechanisms influence these characteristics, and how to improve them? ➢ What are the effects of well-constructed scenarios on individual/organizational cognition	CP, BDT
The organizational context and influences on SP processes	➢ How do human cognitions and social interactions impact SP processes? ➢ What role do emotions play in relation to SP? ➢ How do routines and organizational identity affect SP? ➢ How does the tension between adequate anchoring and power and politics influence various SP processes? ➢ What are the effects of TMT characteristics on SP implementation and outcomes? ➢ What are some mechanisms that may neutralize potential barriers to implementation of SP processes?	CP, SP, UE, SIT, NE, OC
SP team composition, function and positioning	➢ What is the most appropriate composition of the SP team given organizational and environmental uncertainties? ➢ Where in the organizations should the SP team be anchored to be most effective? ➢ How can the core SP team shield SP from organizational influences?	SIT, HR, P, PDP, UE
SP as continuous change intervention	➢ What are the transferring mechanisms within and across levels of SP? ➢ What is the relationship between SP and organizational learning models? ➢ What drives SP interventions in the short, medium and long term? ➢ How do SP interventions influence organizational performance over time?	OL, MLT, CIT, P

Legend: CP: Cognitive Psychology, BDT: Behavioral Decision Theory, SP: Social Psychology, UE: Upper echelons, SIT: Social Identity Theory, NE: Neuro-Economics, OC: Organizational Cognition, HR: Human Resources, P: Psychology, PD: Power dependence, OL: Organization Learning, MLT: Multi level theory, CIT: Change and Intervention theory.

Appendix 1. Literature review

Year	Authors	Firm, Industry or Region	Link to Figure 1	Sample and method	Main motivations / Research question	Key findings	Theoretical perspective
2006	Acar and Druckenmiller		[2]	Conceptual	Present new SB technique combining dialectical inquiry, scenarios, causal maps and systems dynamics	Dynamic and interactive analytical capabilities are achieved, capable of providing backward and future strategic analysis	System Dynamics
2004	Alessandri et al.	The National Ignition Facility. USA	[7] [3-4]	Conceptual and case study	Argue for usefulness of combining qualitative approaches such as SP and qualitative options to value capital projects when faced with high uncertainty	As uncertainty increases, managers use more qualitative approaches in the decision process. Combining elements from management and finance should improve project assessment and evaluation	Finance Hybrid DM approach
2005	Aligica		[2-3]	Conceptual	Investigate epistemic functions of scenarios	Scenarios create knowledge from a psychological (cognitive function) and an epistemic (increase stock of knowledge) point of view	Epistemic
2011	Amer et al.	Wind Energy in Pakistan	[2]	Conceptual and illustration	Explore new approach creating scenarios with fuzzy cognitive maps (FCM)	FCM combines the benefits of qualitative and quantitative analysis to generate consistent and plausible scenarios	SP Literature
2012	Bacon	Russia	[2]	Literature review and case study	Review literature on scenario based accounts for "Russia's future"	Analysis of 13 scenario-based interventions for Russia reveals a rather uniform account of 3 or 4 futures. General scepticism on the validity of the method	SP Literature
2002	Barbanente et al.	Metropolitan Tunis	[7-2]	Case study	Present a case study for scenario building in Metropolitan Tunis, with focus on the political and cultural characteristics of the participants	Despite social and political differences impacting process and participation rate, remaining participants gradually identified themselves as a group	SP Literature
2010	Biloslavo and Dolinsek	Climate change	[2]	Quantitative and simulations	Develop a scenario for global warming from combining the Delphi method, analytical hierarchy process (multi criteria decision method) and dynamic fuzzy cognitive maps	Global warming scenario created, and implications for policy makers discussed	SP Literature

2007	Bishop et al.		[2]	Literature review	Review the techniques for scenario development	8 main categories identified	SP Literature
2008	Boaventura and Fischmann	Information technology - Brazil	[2]	Case study	Development of a method to check content and consistency of future's visions	Proposed method was capable of analyzing the visions of the future and indicate shortcomings and inconsistencies at the studied firm	SP Literature
2010	Bodwell and Chermack		[2-3]	Conceptual	Propose SP as a tool for promoting organizational ambidexterity	Three capabilities of the ambidexterity literature are present in scenario planning: sensing, seizing and reconfiguring	Organizational ambidexterity
2006	Bo et al.		[2]	Literature review and conceptual	Present a new scenario typology	3 main categories are proposed	SP Literature
2010	Brabandere and Iny		[2]	Conceptual experienced-based observations	Outline a new approach for scenario planning	9 step methodology that combines creativity with methodical *prospective* approach. Authors argue this "expressway" to scenarios is fast, impactful, practical and built by top executives. Lack of analysis depth is the trade-off	SP Literature
2005	Bradfield et al.		[2]	Literature review and conceptual	Address the confusion over the definitions and methods of scenarios	No widespread consensus on definition or framework to which scenarios techniques belong. Three main schools identified - Intuitive Logics, Probabilistic Modified Trends and LA Prospective school	SP Literature
2010	Bryant and Lempert	Public Policy. USA	[2] [2-3]	Conceptual and case study	Presents a new approach for scenario building - scenario discovery.	Proposed methodology addresses some of the limitations of qualitative scenario approaches. Provides a firmer foundation for decision analysis	SP Literature
2010	Burt	Firm. International drinks group	[2] [2-3]	Case study	Extend understanding of the art of re-perceiving as proposed by Wack (1985a)	Social discourse during scenario building helps make sense of historical events which were seen but not understood; a new reality emerged. Identifying predetermined elements is a critical element of SP, and central to its success	SP Literature

2011	Burt	Power Industry. UK	[2] [2-3]	Conceptual and case study	Propose integration of SP and systems modelling to identify predetermined elements	Better understanding of the situation emerged from the combination of SP with its intuitive sense making abilities, and the rational analysis of systems dynamic. Both methodologies should be combined in an iterative manner	Systems Modelling
2008	Burt and Chermack		[7] [2-3]	Conceptual	Discuss a wide range of issues concerning SP	SP is a process able to support adaptive organizational learning. Some pitfall of SP are lack of overarching model, implementation and evaluative methods	Individual and organizational learning
2008	Burt and van der Heijden	Global Scotch whiskey industry	[1-2]	Case study	Propose a framework for helping understanding the nature, objective and purpose of Foresight	A framework providing guidance on the purpose of Foresight is proposed and argued as a necessary precondition for the scenario(Foresight) project to be successful and meet expectations	Appreciative system theory
2003	Burt and van der Heijden	Small and medium size enterprises. Scotland	[1-2]	Conceptual experienced based	Different hurdles in foresight methods are discussed	Tacit assumptions about SP, client "state of mind" and fear of the future are hurdles that originate from a lack of purpose clarity before the process starts	SP Literature
2014	Cagnin and konnola	IMS202 intelligent manufacturing system	[1] [2]	Case study	Diagnosis, exploration, prescription	Mapping and devising a framework for scenarios based on main impact dimensions	SP Literature
2006	Cairns et al.	UK local governments and partner organization	[1-2] [7] [2-3] [3-4]	Case study	Compare two cases of scenario interventions in a cross-governmental agencies setting	The role of the project sponsor must be discussed from the outset as it could derail the project. Power influences are important	SP Literature
2011	Chakraborty	Regional planning	[2] [2-])	Case study	Assessing a participatory framework within SP intended for creating awareness and knowledge.	Combining innovative participatory methods and quantitative modelling has potentials. Planner's role should be one of active involvement	SP Literature
2007	Chermack et al.		[2]	Conceptual and empirical	Examines the "strategic conversation" construct within the SP context	Type 1 (individual) and 2 (interaction) conversation and communication skills increased after SP intervention. Results are tenuous due to small sample (n=9) and instrument used	SP Literature

2004	Chermack		[2-3]	Conceptual	Review the potential benefits of SP in aiding decision making	SP has the potential to address four key causes of erroneous decisions: Change mental models, reduce bounded rationality, consideration of exogenous and endogenous variables and, reduce information stickiness and increase knowledge friction	Decision making
2005	Chermack		[2] [3] [4] [6]	Conceptual	Propose a theoretical framework for SP	Model builds from 5 units of analysis: scenarios, learning, mental models, decisions and performance. Hypotheses are proposed	SP literature
2008	Chermack and Nimon	Technology firm. USA	[2-3]	Quantitative	Examine the relationship between SP and participants' decision making style	There were some changes in participant's decision-making (DM) styles three months after the SP effort. Specifically, SP decreased rational DM and increased intuitive DM	Psychology
2013	Chermack and Nimon	USA	[7] [8] [7-4] [8-4]	Quantitative	Examine moderators and mediators in scenario analysis	How employees communicate and form mental models about the organization explains their perceptions of learning	SP Literature Psychology Learning theory
2003	Chermack and van der Merwe		[2-3]	Conceptual	Show the links between SP and the constructivist approach to learning and teaching	Constructivist principles of learning and teaching, such as individual construction of meaning, social influences and social construction of reality can inform the SP process	Constructivism
2006	Chermack et al.	Educational institution. USA	[2-3]	Quantitative	Quantitatively verify the SP assumption of its capacity to increase learning at the organizational level	SP intervention is associated with increased perception of organizational learning. However, reduced sample set prevents generalization	Cognition HRM literature
2010	Chermack et al.		[6]	Conceptual	Position SP and organization ambidexterity as tools for organizational effectiveness	Through their ability to enhance team performance, SP and organizational ambidexterity have the potential to enhance firm effectiveness	Organizational teams
2015	Chermack et al.		[3] [8]	Quantitative	Participant perceptions of organizational climate	Results suggest an overall change in perceptions of organizational climate based on the scenario planning intervention	Psychology Organizational climate SP Literature

2012	Cobb and Thompson	Park planning and management	[2] [2-3]	Case study	Evaluation of scenario planning process	The scenario planning workshops encouraged explorative and active dialogue. Through such dialogue organization resilience is nurtured and innovations adopted	Systems innovation Organizational resilience
2005	Cornelius et al.	Shell	[7] [2-3] [3-4]	Case study (historical)	Present a brief account of the evolution and uses of the Shell scenarios during the last three decades	SP is a good tool for understanding uncertainties but it is not designed for selecting investments and allocating capital. Use scenarios in combination with ROA	SP Literature
2010	Dammers	Territorial Europe	[2]	Conceptual and case study	Discuss new approach for creating scenarios that combines the three well known approaches for scenarios	Combination of strengths of the three different approaches appear to be fruitful because of the quantitative and qualitative dimensions. Institutional feasibility and unsurprising scenarios are noted	SP Literature
2006	Dinka and Lundberg	Technology design	[7-2]	Case study	Understand effects of identity (values and opinions) and role (what they do, professional competences) during technology design via scenario workshops	Both Identity and role have a significant impact on scenario's process and results	Individual identity
2009	Driouchi et al.	Location decision	[3-4] [7-4]	Case study	Presentation of problem structuring methodology to assess real option decisions under uncertainty	By combining robustness analysis, real options thinking and scenario planning, dynamic flexibility is created in project planning	Real option theory
2010	Durance and Godet		[2]	Conceptual	Revising some important concepts of scenarios and foresight	Scenarios and foresight are not synonymous. Distinction between normative and exploratory scenarios. Time implications. Provides tools for methodological rigor	SP Literature
1996	Elington and Trisoglio	Shell	[2] [7-2] [7-3]	Case Study	Present a case study where Shell, despite being a pioneer in scenario planning, ignored trends in the public opinion that were clear, and consequently made wrong decisions	Scenarios constructed at Shell were "individualist" or "hierarchist", which could be associated with the characteristics of a large multinational firm at the time. Obvious trends were missed	SP Literature
2008	Eriksson and Weber		[7-2] [3-4]	Conceptual	Achieve a conceptual consolidation and review methodological aspects of adaptive foresight	Adaptive foresight by adopting ideas of adaptive planning can overcome many of the shortcomings of foresight methods	SP Literature

2011	Evans		[2-3]	Conceptual	Strengthen theoretical foundations of SP by drawing parallels with evolutionary theory	Because SP has modes of selection and variation at the firm level, evolutionary theory is a useful approach for strengthening SP conceptual foundations. SP has the potential to induce firm's exploratory learning and variation, or reinforce structural inertia	Evolutionary theory
2005	Fink et al.		[2] [5] [4-5] [5-4] [2-5] [5-2] [5-1]	Conceptual	Describe new strategic foresight approach by combining external (market uncertainties) and internal (resource based approach) scenarios	The combined approach is able to create a strategic early warning system	Resource based view
2009	Forge	EU policy	[2]	Conceptual and case study	Present a novel approach that combines a number of methods in order to produce a robust tri level quantitative estimators, driven by qualitative analysis	It is possible to combine micro and macro level variables by using meso economics	Economics
2010	Freemand and Pattinson		[7] [2-3]	Case study	Explore different "client" relationships.	Client involvement is necessary. His/her positioning in the firm's network could act as a transfer conduit of the scenario learning experience to the rest of the organization, or as barrier	SP Literature
2010	Gilley et al.		[7-2]	Literature review and conceptual	Construct theoretical model for building effective teams	Several independent and disconnected theories are summarized into a synergetic and comprehensive model for building effective teams	Organizational teams
2012	Glick et al.	Organizations involved in SP projects (10)	[2-3]	Quantitative	Empirically assess the effects of SP on participant's mental models	Evidence of SP being able to alter some of individual's mental model styles	Cognition
2010	Goodier et al.	Construction	[2]	Case study	Present scenario building approach that shift focus from company level into industry level	Findings show that the process successfully engaged participants and helped them understand potential collective issues	SP Literature

2001	Goodwin and Wright		[7] [3-4]	Conceptual and hypothetical case	Propose a method for addressing an underdeveloped aspect of SP: the assessment of alternatives across a range of scenarios	The use of multi-attribute value modelling meets the needs for a formal strategic evaluation process within SP potentially avoiding biases emanating from use of heuristics when making decisions	Decision analysis
2010	Goodwin and Wright		[2]	Literature review and conceptual	Review of the methods intended for aiding in the anticipation of high impact, rare events	Forecasting methods and non-forecasting methods (such as SP) are problematic in anticipating rare events and firms should 1) have downside protection and 2) provide conditions for challenging thinking	Forecasting SP Literature
2011	Gordon	South Africa and Tanzania	[1-2] [7-2]	Case study (contrasting cases)	Investigate under which conditions "visionary" scenarios are useful	Paper sets limits to when "visionary" scenarios should be used, and when alternative methodology with an "adaptive" focus should be pursued	SP Literature
2011	Hanafizadeh et al.	Investment company. Iran	[7] [3-4]	Case Study	Integrating scenario planning and a MCDA method - PROMETHEE	The combination of the two methods created a portfolio that is stable in four different scenarios	Portfolio theory
2009	Hanssen et al.	Regional foresight	[7-2]	Conceptual	Identify and discuss potential dilemmas related to democratic legitimacy of foresight processes	Foresight processes generally lack procedures to ensure compliance with democratic values. Equal participation is not guaranteed. Accountability is tenuous and level of transparency inadequate	Governance literature
2003	Harries		[4]	Conceptual	Provide a framework for the evaluation of scenario planning as DM tool	Scenario-based DM evaluated from a case based, empirical or theoretical point of view. Each has been inconclusive to determine if and how scenario-based DM is beneficial	SP Literature
2013	Harris		[7] [7-2] [7-3]	Conceptual and case study	Challenges for scenario teams	Scenario planning process as learning and the role of scenario teams	SP Literature Learning theory
2012	Heinonen and Lauttamaki	Climate and energy policy. Finland	[2]; [3-4] [7-2]	Case study	Present an example on how Foresight can assist public policy formulation	Generally useful, although some problems are reported with relation to predictability, disconnection to decision-making and modification of results to make them more palatable in a political context	SP Literature

2008	Hodgkinson and Healey		[7]	Conceptual	Make propositions for the design of SP interventions centred around team composition	The starting point for design processes - in SP or elsewhere - should be at a theoretical level, borrowing from existent theory, rather than from problem specific empirical studies	Personality and social psychology
2002	Hodgkinson and Wright	Firm in global publishing industry	[8] [3-4]	Conceptual and case study	Report and reflect on the reasons for a failed SP intervention	Psychological defensive mechanisms were triggered by the stress generated from the SP intervention which highlighted threats, but no clear strategic alternatives	Conflict theory of DM
2011	Hosseini et al.		[7] [3-4]	Conceptual	Discussion of uses of MCDA in strategic decision making	Proposal of new approach for using MCDA in combination with scenarios to aid strategic decision-making	Decision analysis
1987	Huss and Honton		[2]	Literature review and conceptual	Describe 3 SP techniques with & advantages and disadvantages	A firm's choice of SP techniques might partly depend on the level of detail required to make a decision	SP Literature
1999	Islei et al.	Pharmaceutical industry. UK	[2]	Case study	Present the results of using judgmental modelling in a scenario workshop with 18 senior managers	Combined methodological approaches are necessary for group decision making. Judgmental modelling aided in the analysis of outcomes. The use of technology to quantify and interpret group data moderated the workshop	Judgmental modelling
2010	Jair van der Lijn	Sudan	[2]	Case study	Compare 4 scenarios for Sudan in year 2012	Four scenarios developed, implications and policy options. High similarity in the scenarios constructed in different workshops is noted	SP Literature
2011	Jitter and Schweinfurt	Solar energy	[2] [2-3]	Conceptual and case study	Improve cognitive mapping for scenario planning by combining quantitative analysis and integration of stakeholders' mental models	Fuzzy cognitive mapping (combines intuitive cognitive mapping with quantitative analysis) has potential to overcome information processing limitations. Different plausible scenarios can be created	SP Literature
2001	Johnston		[4] [7]	Conceptual	Review the leanings and limitations of foresight studies	Need of better theoretical base. Evaluation, linkage to strategy and cultural considerations are under-developed areas of foresight studies	SP Literature
2012	Kahane		[2] [7] [2-3]	Conceptual	Present a new scenario planning methodology - Transformative	Some reference to scenario team composition	SP Literature

2013	Kennedy and Avila	Brazil automotive industry	[1] [2] [7-4]	Case study	Macro-economic and political stability as criteria for scenarios together with market uncertainty	Scenario based models predict volatility in Brazil vehicle market and helps auto maker forecast future demand	SP Literature
2008	Keough and Shanahan		[7c] [2] [4] [6]	Conceptual	Collapse common elements in different SP methodologies into a generic model	The proposed generic SP model include 5 constructs: Engagement, team composition, SB, decision process and increased performance	SP Literature
2010	Kivijarvi et al.	University management and manufacturing industry	[2-3]	Conceptual and case study	To provide a conceptual base for scenario process as a community of knowledge sharing that promotes organization innovativeness	Inconclusive evidence of scenario process as capable of promoting knowledge creation, sharing, and sustain organizational innovativeness	Knowledge creation
2007	Korte and Chermack		[2-3]	Conceptual	Investigate scenario planning as a tool to change organization culture	SP invites change in organizational culture by facilitating the reconstruction of shared mental models that govern the actions of the organization	SP Literature
2009	Kowalski et al.	Renewable Industry - Austria	[2] [3-4]	Case study	Analyse the combined use of scenario building and participatory multi-criteria analysis (PMCA)	Assessing scenarios with PMCA is resource intense but the methodology allows for a robust and democratic DM process	Decision analysis
2006	Lempert et al.	Pollution control	[7] [3-4]	Conceptual and case stud	Demonstrate an approach for finding robust strategies under conditions of deep uncertainty	Robust, adaptive DM under uncertainty can be born from combining ideas of SP with decision analysis approach	Decision analysis
2004	MacKay and McKiernan		[7-2]	Conceptual	Deepen the understanding of the effects of hindsight over foresight	Counter-to-factual analysis can reduce hindsight which results from shallow perceptions of history, thus enhancing foresight	Psychology and history
2010	MacKay and McKiernan		[2] [8] [2-3]	Conceptual and experienced based observations	Investigate possible dysfunctions and dark sides of creativity and innovation within scenario planning	Four dysfunctions are inferred and four options for dealing with them are proposed	Organizational psychology
1987	Maddox et al.		[2]	Conceptual and short experiments	Review of "imaginary" and its possible applications in scenario planning	Imaginary techniques combined with rational processes can enhance the scenario planning processes	Educational research

2009	Mahmoud et al.	Environmental decision making	[2] [5-1] [5-3]	Conceptual	Proposal of a formal approach to scenario development in environmental decision making	A potential unifying framework with impact in DM requires validation, verisimilitude, confidence and clear communication. It is an iterative, dynamic process. A performance criteria for reward/penalty should be present	SP Literature
2011	Mahmud	City planning. Indonesia	[2]	Case study	Development plan to formulate a 25 year city vision	City preferred future. Shows inconsistencies like "no data", "preferred future", "position the strategy for that future" etc.	SP Literature
1988	Mannermaa		[1-2]	Conceptual	Investigate the implications and new perspectives that complexity thinking can bring to "futures research"	Ideas brought from complexity thinking outline a new concept for “futures research”	Complexity theory
2014	McWhorter and Lynham		[1] [2] [4] [7]	Conceptual	Virtual scenario planning	Virtual SP activities facilitate interaction between geographically dispersed locations reducing costs and providing access to learning tools	Human resource management theory Learning theory
2005	Mietzner and Reger		[2]	Literature review and conceptual	Discusses differences in scenario approaches	Some scenario techniques are revised. Strengths and weaknesses discussed	SP Literature
2003	Miller and Waller		[3,4] [4-5] [5-4]	Conceptual	Present an integrated risk management process using SP and ROA, which have complementary strengths and weaknesses	The integrated risk management approach incorporates RO and SP as a bottom-up approach that remains mainly qualitative, and promotes coordinated strategic and financial hedging responses to environmental uncertainty	Risk management
1989	Mobasheri et al.	Electric utilities	[3-4]	Case Study	Present a case study of SP planning implementation at Southern California Edison	The SP process enabled the development of strategies. Scenario-based planning became the standard way of planning after bad experiences with traditional forecasting methods	SP Literature
1996	Moyer	British Airways	[2] [2-3]	Case study	Present the scenario planning exercise and lessons learned at British Airways	Scenarios caused British Airways to broaden their views	SP Literature
2009	Moyer and Bahri		[2]	Conceptual and (virtual) case study	Investigate new method for generating scenarios - hybrid intelligent scenario generator	Proposed hybrid methodology allows coexistence in scenario creation of fuzzy rules and a learning algorithm able to learn and correct from experts	Intelligence systems

2012	Muskat et al.	Demographic changes	[2]	Refurbished case study	Investigate mixed methodology approach with a qualitative-quantitative-qualitative sequence for scenario generation	Usage of a quantitative layer within a qualitative scenario generation is beneficial as it is able to reduce bias and generate results of high frequency and consistency	SP Literature
2011	Norwack et al.		[2]	Literature review and conceptual	Investigate how the Delphi method can enhance the quality of scenario planning	Recommends integrating the Delphi technique with scenario studies	SP Literature
2010	O'Keefe and Wright	Manufacturing	[7] [8] [3-4]	Case study	Present a case study for an unsuccessful SP intervention in an organization	Inertia in DM can be extreme. Even if pressure for change is strong, this will not guarantee a change in strategy if past decisions are at risk of being questioned, thus unsettling some powerful individuals	Conflict theory of DM / structural inertia
2010	Ozkaynak and Rodriguez-Labajos	Projects in Turkey and Spain	[2]	Conceptual and case study	Develop an approach for local-scale scenario building	Clarifies conditions under which different interaction methods can be used for local scenario building	SP Literature
2009	Pagani	3G mobile TV in Europe	[2] [3-4]	Case study	Provide a tool for developing corporate or business strategies	Combination of strategic thinking and scenario evaluation via cross impact analysis allows the generation of qualitative and quantitative scenarios that can be used as a planning tool	SP Literature
2008	Pagano and Paucar-Caceres		[2-3]	Conceptual	Examination of a framework for systematic elicitation of knowledge from individual level to firm level	Connections between scenario building and causal mapping as elicitation methods are made to the developmental dimension of the Holmic framework for organizational learning	Organizational learning
2010	Page et al.	Tourism, Scotland	[2]	Case study	Use of scenario planning as a methodology to help understanding the future of tourism	SP, when combined with quantitative tools, such as economic modelling, has the potential to identify a range of issues to aid policy makers	SP Literature
2015	Phadnis et al.		[3] [3-4] [8]	Case study (field experiments)	Effects of scenario planning on field expert's judgment of long-range investment decisions	Use of multiple scenarios does not cause an aggregate increase or decrease in expert's confidence in their judgment. Rather, judgment changes in accordance with how an investment fares in a given scenario	SP Literature Psychology
2001	Phelps et al.	Water and IT Consultancy UK	[6]	Case study	Explore the effects of SP on firm performance	Some tentative evidence of improved financial performance as a results of SP in two UK industries. Small sample and lack of	SP Literature

						control variables reduce the validity of the results	
2010	Piirainen and Lindqvist	Paper Industry	[2]	Literature review and case study	Introduction of two new methods to create scenarios. Both methodologies are mediated by Group Support Systems (GSS)	Both methodologies proposed - IDEAS and SAGES - are suggested as capable of reducing resources in the scenario building phase, but rigor is also reduced	SP Literature
2007	Pina and Chia		[7] [2-3]	Conceptual	Discuss role of teams in improving organization's peripheral vision	Teams with exploratory purposes, specially of the minimally-structured and immersed type, might aid organizations in exploring the periphery	Organizational teams
2005	Postma and Liebl		[2]	Conceptual	Elaborate alternative scenario building techniques to overcome drawbacks of current methodologies	Causality and consistency in scenario building, which are deemed as necessary, could lead to serious issues in the presence of complex and paradoxical trends not considered beforehand. Alternative SB techniques are proposed	SP Literature
2011	Ram et al.	Food Security in Trinidad and Tobago	[2]	Conceptual and case study	Introduce regret as a comparison criteria across different options; and present a new methodology for constructing scenarios faster	The proposed methodology could be deployed quickly; incorporates subjective judgments for multiple objectives, and is able to evaluate options across and within scenarios. Several drawbacks are noted	Decision analysis
2006	Rikkonen et al.	Public sector strategic planning. Agricultural	[2]	Literature review	Present use of expert's information in strategic planning processes.	Delphi studies promote alternative approaches to strategic thinking by broadening the knowledge base. Two alternative Delphi approaches are discussed	SP Literature
2006	Roubelat	Electricite de France	[7] [2-3]	Conceptual and case study	Analyse the parallels between SP and emerging ideologies and present a longitudinal case to illustrate interest and traps of the SP methodology	Organizational structures are rarely adapted to question dominant paradigms; hence the need to have a SP network outside the corporation capable of challenging old paradigms	SP Literature
2000	Roubelat		[1-2]	Conceptual	Review SP in light of its capacity to use and create networks	The context of corporate SP is always in motion; shifting. Thus a need for a network structure, not single companies' efforts for creating overall scenarios (global, environmental, not strategic). Smaller firms can benefit from such networks	SP Literature

2014	Sankaran et al.	Australian aged care and community care	[2] [8] [7-3-4]	Qualitative (workshops and observations)	Action research to show connection between theory and practice	Showed importance of leadership skills and emotions in driving scenario planning and building. Passion, emotions and power were emphasized in the process	Action research and practice theory Emotions
2011	Sarpong		[5-1]	Conceptual	Investigate scenario thinking as an everyday practice	Scenario thinking should not be seen as an episodic intervention but an everyday practice. Academics looking at scenario thinking need to understand daily practices at the firm and how those are enacted	Social theory of practice
2011	Sarpong and Maclean	Product innovation teams. Software firms	[2-3] [5-1] [5-4]	Conceptual and case study	Increase understanding of causal link between scenario thinking and innovation	Scenario thinking as a dynamic, iterative and never completed practice. Does not necessarily lead to innovation. Creative emergence and open-endedness of the practice as mechanisms potentially leading to innovation	Social theory of practice
1993	Schoemaker	MBA students. University of Chicago	[2-3]	Experiments	Understanding why the use of scenarios is growing and its psychological effects	SB expands people's thinking by focusing on biases of the human mind such as overconfidence and anchoring	Psychology
1995	Schoemaker	Two organiza-tions	[2] [2-3]	Conceptual and Case study	Describe scenario building process and how to use the resulting scenarios for the benefit of firm's futures	Good scenarios can overcome cognitive biases such as overconfidence and tunnel vision	SP Literature
2002	Sedor	Professional sell side analysts	[2-3]	Quantitative	Investigate whether information presented within a scenario framework affects analysts forecasts	When managers present future plans to analysis framed as scenarios, analysts tend to issue more optimistic forecasts two years out	Psychology
2006	Selin		[7] [7-2] [2-3]	Conceptual	Discuss how scenarios attain and compel people to action, or influence decisions from the conceptual understanding of trust	Scenarios are not about truth but trust. Whose ends are being served by presenting scenarios one way or another? Trustworthiness in scenarios should be investigated from the sources, content, methodology, narrative and dissemination	Trust and power theory

2011	Sextant et al.	UK construction	[2]	Case study	Develop a method using causal mapping for combining perspectives of multiple participants, in a multi organizational context, during the scenario creation	A collective map merging causal mappings from several participants was created. This map helped increase the understanding in a wider context at the cost of taking longer time and being more intellectually demanding	SP Literature
2015	Sharma and Yang	Interactive digital media industry	[2] [3] [7]	Case study	New methodology combining qualitative and quantitative tracking of dimensions via automated web crawler	Plausible new scenarios are generated which are particularly useful in dynamic industries	SP Literature
2005	Smith		[1-2]	Conceptual	Make an assessment of the validity of complexity theory, and its implications towards Foresight such as forecasting or SP (If complexity thinking is validated, these techniques become irrelevant)	It is premature to give theory status upon complexity as full explanation of how it works in firms and social systems has not been presented. There is no evidence in favor of disregarding forecasting or scenario techniques	Complexity theory
2011	Soderholm et al.	Global. Climate change	[2]	Literature review and conceptual	Analysing the differences in the scenarios previously presented, especially in relation to governance and institutional issues	Both qualitative and quantitative scenarios have serious limitations. Need for a synthesis of quantitative and qualitative methods for scenario analysis	SP Literature
2006	Song et al.	Beijing	[2] [7] [3-4]	Case study	Use SP to sketch Beijing's 2020 urban planning	SP is informative and can accommodate uncertainty. The MAUA evaluation framework to assess scenarios informs decision makers	SP Literature
2009	Sounders	Music Industry	[2]	Case study	Suggest a visual technique to collect scenario planning information	The collage technique can overcome some of the problems of verbal communication techniques	SP Literature
2014	Stepchenko and Voronova	Baltic non-life insurance	[2] [7-4] [5-4]	Case study	Six leading Baltic non-life insurance companies	Risk management and scenarios based on both qualitative and quantitative measures	Finance and risk management
2013	Stewart et al.	Agricultural policy planning	[7] [3-4]	Conceptual and hypothetical example	Review and explore synergies between MCDA and scenario planning	Synergies between scenario planning and quantitative decision modelling can be exploited in complex decision contexts	Decision analysis

1990	Stokke et al.	Oil and Gas. Norway	[3-4]	Case study	Present a case study for scenario-based decision making	SP can improve Statoil's R&D strategy development by better understanding the range of strategic alternatives and increasing strategic resilience	SP Literature
2007	Storberg-Walker and Chermack		[2]	Conceptual	Presenting examples of alternative ways for completing the conceptual development phase of theory	Parallels are drawn between Schwartz's (1991) 8 step SP process (creating scenarios) and Whetten's (2002) process for creating theory. The SP method could answer what and how questions, plus generating hypotheses, but it lacks evaluation criteria	Theory building
2010	Strauss et al.	Financial institution. South Africa	[2] [7] [3-4]	Conceptual and case study	Present a framework combining stochastic modelling and intuitive logic scenarios to analyse risk and uncertainty simultaneously	Complementarities of the two methods in the proposed framework should lead to improved decisions	SP Literature
2012	Tapinos		[2] [1-2] [3-4]	Conceptual	Make explicit the relationship between perceived environmental uncertainty and scenario planning	Propositions are developed linking scenario planning to different levels of environmental uncertainty and making explicit the need to embed scenario planning in the firm's strategic process	Uncertainty and perceptions
2010	Tevis		[2] [1-2]	Conceptual	Question predominant adaptive stance of scenario planning. Proposing instead goal-oriented SP	Building from the concept of enactment, a 5 step framework is proposed which emphasizes a goal-oriented SP (create future that the firm wants), not an adaptive one	Sociology
2011	Totzer et al.	City of Steyr. Austria	[2-3]	Case study	Investigate if transdisciplinary processes can support more stable structures in a region	SP workshops generated knowledge by means of collaborative research. A learning process was initiated	Trans-disciplinary
2013	Vainauskiene and Vaitkiene		[1] [2] [4-5]	Conceptual	Integrating the planning process of brand vulnerability scenarios into the brand management process	Focus on scenario planning process as stage-wise process	Strategic brand management
2004	van der Heijden		[1-2] [5-1]	Conceptual	Reflect on the use and value of SP, after many years of use by organizations	Four reasons for using SP, each with different difficulties and likelihood of success are proposed. Firms should be clear from the outset what they want from SP	SP Literature

2000	van der Heijden		[2-3]	Conceptual	Discussing the role of scenarios from two different perspectives	Scenarios play an 1) anticipatory role of the future by means of challenging mental models; and 2) a social interaction role by attempting to find a middle ground between group think and fragmentation	SP Literature
2010	Varum and Melo		[2]	Literature review and conceptual	Organize the SP literature due to growth on published research	Increased number of publications centred on methodologies. Shortage of theoretical literature. Notable lack of literature on the use and effects of scenario planning in business and effects on performance	SP Literature
2009	Visser and Chermack	9 firms in several industries	[6]	Case study	Investigate the relationship between SP and firm performance	None of the 9 companies in the study reported means of formally assessing the value of SP. The perception from 7 of the participants was that it affects firm performance	SP Literature
1999	Vlek et al.	Policy for metropolitan traffic. The Netherlands	[7] [2-3]	Case study	Empirically analyse the hypothesis that the ways individuals evaluate different scenarios affect their order of preference in such scenarios	A formal multi-attribute evaluation of scenarios leads to a different ordering of preference than scenarios being evaluated intuitively. The degree of satisfaction is also lower	Behavioural decision making
2009	Volkery and Ribeiro	Public policy making	[7] [3-4]	Literature review and case study	Investigate uses, impact and effectiveness of scenario planning in public policy making	Scenario planning is often carried out in an ad hoc and isolated fashion, and as indirect decision support. More stable institutional settings are needed to test the method	SP Literature
2010	von der Gracth and Darkow	Logistics industry. Germany	[2]	Case study	Present findings on an extensive Delphi based scenario generation for the future of the logistics service industry in Germany	Study propose different likely scenarios for the industry and allows for some prioritization among these	SP Literature
2008	Walton		[2]	Conceptual	Analyze the philosophical underpinnings of SP	A general framework for governing and observing SP and whether it meets requirements of good theory. No such theoretical foundations exist for scenarios. Evaluation of constructs such as validity, generalizability or predictability do not apply	Epistemic and ontological

2015	Weng and Lin	Mobile computing technologies	[1] [2] [4]	Qualitative (expert panel)	Classification of decision-making criteria in mobile computing device and software technologies	Most mobile computing software technologies are rated high to medium in importance and low risk in both scenarios (big demand and pessimistic scenario), and scenario changes will have little impact on mobile computing devices and software	SP literature
2000	Wilson		[7] [3-4]	Conceptual	Examine the causes of implementation problems after scenarios have been constructed	Scenario projects fail mostly because of lack of strategic actions. For scenario planning to be effective, time and practice are necessary	SP Literature
1998	Winch		[2]	Conceptual and short examples	Analyse the benefits of combining scenario building with system dynamics	Scenarios cannot expose the dynamic nature of change. Systems dynamics can aid in better simulating possible futures	System dynamics
2009	Worthington et al.		[2-3]	Conceptual	Article explores potential of SP as a tool for promoting innovation and corporate entrepreneurship	Scenario/contingency planning allows firms to leverage organizational learning and enhance managerial capabilities. It should be seen as opportunity generator, not only as risk mitigator	Organizational learning
2005	Wright		[2-3]	Conceptual	Propose scenarios as prospective sense making devices	Suggests that transformational change is achieved through inductive strategizing at the periphery. Scenario should be viewed as a device to enhance sense-making rather than decision-making	Social constructionism
2000	Wright		[5-1] [5-4]	Conceptual	Draw parallels between SP and quality management	SP is an iterative process that must be continuously improved and corrected as new insights and knowledge is gathered. SP could be seen as a quality approach to strategy	Organizational learning and quality management
2009	Wright and Goodwin		[2-3]	Conceptual	Assessing the ability of SP to deal with problems of low predictability	Conventional SP restricts the range of potential scenarios; might reinforce current views. 4 proposals are made to enhance the method in dealing with low predictability events	Cognition
2008	Wright et al.	Drinks industry. Scotland	[8] [1-2] [3-4]	Case study (contrasting)	Contrast a successful SP intervention in an organization with an unsuccessful one as reported by Hodgkinson and Wright (2002)	SP has the potential to overcome inertia in organizations but DM dilemma could accentuate inertia. Pre-interview data can aid practitioner determine whether an organization will be receptive or not to a SP intervention	Inertia in DM / conflict theory

2009	Wright et al.		[2] [7] [3-4]	Conceptual	Propose remedies to SP pitfalls identified by O'Brien 2004. Additional pitfalls and remedies are discussed	Several recommendations to enhance scenario building are proposed. Multi-attribute value analysis is presented as an alternative to evaluate robustness of strategy in the constructed scenarios	SP Literature Decision analysis
2012	Zegras and Rayle	Urban planning community in Portugal	[2-3]	Case study and empirical	Assessing participant's propensity for collaboration and change in perceptions	Effects remain inconclusive, very modest support for increased collaboration, and no change in participant's perception after the intervention	Psychology and collaboration