The impact of scenario planning on entrepreneurial orientation

Abstract

It is well established in the foresight literature that strategy tools, such as scenario planning, have multiple reported outcomes. Much of the existing research focuses on direct outcomes, such as identifying uncertainties and developing strategies. While indirect outcomes, such as improving organisational learning and culture, are acknowledged, the existing literature provides limited empirical evidence. This paper focuses on an indirect outcome of scenario planning that has largely been ignored: entrepreneurial orientation. This research investigates whether the use of scenario planning affects key dimensions of entrepreneurial orientation among organisations that engage with it. Our model is tested through a series of hypotheses, taking advantage of a unique dataset of 133 companies from the health sector in France. This study uses a partial least squares (PLS) analysis; the findings show that scenario planning promotes risk-taking and proactive behaviour, but does not affect the innovativeness of organisations that use it. Based on these findings, we theorise about the impact of scenario planning on the entrepreneurial behaviour of organisations and discuss the practical implications of this research.

Keywords: Scenario Planning; Entrepreneurial Orientation; Proactiveness; Risk-Taking Behaviour; Innovativeness

1. Introduction

It is well established in the literature (Idoko and MacKay, 2020; Meadows and O'Brien, 2020) that companies rely on strategy tools to guide their strategic analyses and strategic-development processes. Faced with increasing levels of turbulence, uncertainty, novelty, and ambiguity (Ramirez and Wilkinson, 2016), many companies are choosing to employ scenario planning (Ramirez et al., 2020; Wright et al., 2020) to support their strategic-planning processes. After several decades of research on scenario planning, which is one of the most popular strategy and foresight tools (Rigby and Bilodeau, 2007; 2015), there is a broad understanding that scenario planning is an umbrella concept, covering a wide range of methods and approaches (Amer et al., 2013). It allows companies to engage with the future, focusing in particular on the various uncertainties that make it difficult to develop longer term strategies.

Significant variations have emerged in the way that different schools of thought apply scenario planning (Bradfield et al., 2004), based on their philosophical approaches and the type of data

(qualitative vs. quantitative) used. The key commonality between all scenario-planning methods and frameworks is the belief that single-point projections or extrapolations of current trends cannot provide a solid foundation for strategising the future in a context of uncertainty. Scenario-planning methods offer ways to examine the future using multiple plausible images (Ramirez and Selin, 2014). In contrast to traditional planning approaches, scenario planning does not attempt to predict the future; instead, it engages managers in strategic conversations to develop shared understandings of the nature of the uncertainty, thus creating a platform to strategise for the future (Metz and Hartley, 2020).

Research on strategy tools (Jarzabkowski and Spee, 2009; Vanna and Whittington, 2012) has recently shown that tools have several outcomes (Rengarajan et al., 2021), some intended and some unintended (Jarzabkowski et al., 2013; Wright et al., 2013). Reviewing this field, we deduce that the outcomes and affordances can be both direct and indirect. Hodgkinson et al. (2006) observed that there is limited research on the unintended and indirect outcomes of strategy tools. Burke and Wolf (2020) deduced that indirect outcomes are more evident when managers develop their own tools for strategy development. For example, in the case of scenario planning, strategy development is a direct outcome (Ramirez et al., 2017), while organisational learning and shared mental models are indirect outcomes (see Burt and Nair., 2020, for a comprehensive review). Considering Wack's (1985) view that scenario planning is '*a process for rediscovering the original entrepreneurial power of creative foresight in contexts of accelerated change, greater complexity, and genuine uncertainty*', this paper investigates the extent to which scenario planning affects entrepreneurial orientation (EO thereafter)in organisations.

EO continues to grow in importance in the entrepreneurship and strategy literature (Singh et al., 2019; Vaznyte and Andries, 2019). As a concept, EO refers to methods, practices, and decision-making styles that enable managers to act in entrepreneurial ways (Lumpkin and Dess, 1996). Although many studies have examined the relationship between EO and firm performance, few have focused on the development of EO (e.g., Green et al., 2008; Engelen et al., 2013; Rodrigo-Alarcon et al., 2018).

Despite increased interest in strategy tools in both the strategy (Spee and Jarzabkowski, 2009) and entrepreneurship literature (Thompson and Byrne, 2020), we have observed a distinct lack of research into strategy tools, such as scenario planning, that affect EO. In this paper, we explore this relationship, building on the existing literature to develop three hypotheses. The research is confirmatory proposing an integrative model, which analyses the relationship

between scenario planning and EO. Having taken advantage of a large dataset from the French healthcare sector, our findings have two main theoretical implications. First, this study answers recent calls for a better understanding of scenario planning outcomes (e.g., De Smedt et al., 2013; Frith and Tapinos; 2020), with wider contributions to the strategy tools literature (Bowman, 2016; Spee and Jarzabkowski, 2009). Second, it shows empirically that scenario planning affects entrepreneurial behaviour and contributes to the literature on factors that influence entrepreneurial orientation (Stam and Elfing, 2005; Miller, 2011; Covin and Wales, 2012; Guerrero and Urbano, 2017) by showing that the use of multiple images to anticipate the future can affect entrepreneurial behaviour.

This paper is structured as follows. It begins by presenting the theoretical framework (scenario planning and entrepreneurial orientation) and then derives the hypotheses. This is followed by the research methodology and results. The article concludes by discussing the research findings and their implications for theory and practice.

2. Literature review

2.1 Scenario planning

Scenario planning is a tool used by organisations to contemplate the future and its uncertainties in order to support strategy making (Amer et al., 2013; Schwarz et al., 2019). It was first applied in the military, and specifically in prospective armaments research. It was later adopted in the business field, where long term planning was needed under conditions of uncertainty (Bradfield et al., 2005), however, its use has expanded to a wide range of fields beyond planning (see Knight et al., 2020, for a review). Its success is largely due to its ability to integrate both uncertainties and interdependencies between environmental factors and change (O'Brien and Meadows, 2013). The concept has been interpreted widely since the work of Kahn and Wiener (1967), who defined the term 'scenario' as a '*set of hypothetical events set in the future, constructed to clarify a possible chain of causal events as well as their decision points*'. In explaining the significant role that scenario planning plays in decision-making, Meissner and Wulf (2013) have argued that the method's advantage is its capacity to develop multiple plausible images of the future, providing a basis for strategy generation.

As previously mentioned, there are several schools of scenario-planning practice. Bradfield et al. (2005) have divided the various approaches into the following three schools: intuitive logics,

the probabilistic trend, and the French 'La Prospective' school. Chermack (2011) identifies ten different approaches, which overlap with Bradfield et al.'s (2005) division, according to Frith and Tapinos (2020). Another review of the scenario-planning process (Hussain et al., 2018) concludes that, despite the plethora of methods used, even within individual scenario-planning schools, the requirements and circumstances of each intervention create variation. Methods also differ by activity, providing opportunities for a range of different insights. For example, Wright's method (Bradfield et al., 2016; Cairns and Wright, 2018; Derbyshire and Wright, 2016) has a particular focus on exploring the causality between driving forces that will shape the future.

Tapinos (2012) suggested viewing the scenario-planning process into to two key phases: scenario development and using the scenarios strategy development. The scenario development phase has two key components which are shared in all methods: i) *preparation* which involves setting up the focus of the intervention and identifying the driving forces that are perceived as to be both important and uncertaint for anticipating the future; and ii) *scenario building* using the outcome of the previous phase. Therefore, in this paper, we consider that a generally accepted description of the scenario-planning process has these three key phases: preparation, building, strategising. Research on scenario planning also emphasises its creative nature. Unlike traditional planning approaches, scenario planning is an innovative process that operates by developing new capabilities and building new social capital (Lang and Ramirez, 2017). By investing the driving forces that shape the future, it promotes creativity, innovation, and strategic decision-making (Heger and Rohrbeck, 2012; Tapinos, 2013). The work of De Smedt et al. (2013) and Worthington et al. (2009) has highlighted the value of this method in developing entrepreneurial behaviour. Despite the popularity of scenario planning, however, very few studies have addressed its benefits. Past research provides only a few expert consultations and case studies of successful interventions (Idoko and MacKay, 2020; Meissner and Wulf, 2013). Some studies have investigated the impact of scenario planning on organisational skills, including organisational learning (Bootz, 2010; Chermack et al., 2006; Chermack and Van der Merwe, 2003), innovation (De Smedt et al., 2013; Drew, 2006; Van der Duin and Hartigh, 2009; Worthington et al., 2009), and opportunity identification (Sarpong and Maclean, 2011).

A central feature of any scenario planning intervention is the extent to which it anticipates and makes sense of a company's environmental discontinuities. This feature can help companies adapt, using the options generated by unexpected change. The strategy-as-practice literature

(Spee and Jarzabkowski, 2009; Paroutis et al., 2015) demonstrates that strategy tools are boundary objects, which '[when] *used effectively, enable integration of knowledge across boundaries, which explains why strategy tools enable sharing and integration of information about strategy within an organization*' (Spee and Jarzabkowski, 2009, p. 228). The strategic conversations that take place during the application of these tools create mental models and a shared understanding of organisational priorities and orientation (Kaplan, 2008). Scenarios based on strategic conversations have been found to exhibit the same characteristics as boundary objects (Bowman, 2016), as a '*means of conveying and transferring* knowledge' (p. 83) (van der Heijden, 2006). Moreover, both strategy tools (Spee and Jarzabkowski, 2009) and scenario planning (De Geus, 1988) have long been viewed and used as transitional objects (artefacts that link changes between two states, Winnicott, 1967); Burt (2003) explores their '*epigenetic*' and transformative role. Extending this argument, Worthington et al. (2009) show that scenario planning can help organisations move '*beyond risk mitigation*' by exploring opportunities within uncertain environments. This can improve organisational learning by supporting an organisation's capacity to innovate (von der Gracht and Stillings, 2013), ultimately leading to advanced entrepreneurial behaviour and corporate entrepreneurship (Ireland et al., 2009).

The literature discusses a range of benefits, advantages and effects associated with the application of scenario-planning outcomes. Burt et al. (2020), building on Child (1972) argue that all managerial actions and choices have unintended consequences, both positive and negative. The main outcome achieved with the scenario-planning tool is exactly what its name suggests: planning. Planning takes the form of strategy development (Schoemaker, 1993); the assessment of existing strategies (Schoemaker, 1995); and contingency planning (Bloom and Menefe, 1994). Extensive research on the use of this tool has revealed some by-products that, in themselves, constitute significant outcomes and benefits. For example, van der Heijden (1996) shows that scenario planning can help to understand the external environment, while the organisations studied in Shoemaker et al. (2013) use the identification of weak signals and strategic radars to evaluate and monitor highly uncertain forces. Less tangible scenario-planning outcomes include improving decision making and organisational learning (Chermack, 2004); making sense of the future (Goodwin and Wright, 2001); changing organisational culture (Mietzer and Reger, 2004); balancing deliberate and emerging strategies; fostering organisational ambidexterity (Bodwell and Chermack, 2008); Huffman (2017); and showing that scenario planning can help to avoid overconfidence and tunnel vision. Finally, Phelps et al.

(2001) demonstrate the positive impact of scenario planning on organisational performance. In discussing the disadvantages and negative effects of scenario planning, Mietzer and Reger (2004) note that it can be quite time consuming. According to Huffman (2017), scenarios need regular updating; Roxburg (2009) criticises the scenario-planning process for creating overconfidence about the future. Another case-specific negative outcome of scenario planning has been identified by Burt et al. (2015), who deduce that an extensive use of scenario planning causes managers to develop managerial hyperopia.

2.2. Entrepreneurial orientation

The concept of EO attracts the interest of strategy and entrepreneurship researchers (Wales et al., 2020). It refers to an organisation's strategic orientation, capturing entrepreneurial practices and behaviours (Lumpkin and Dess, 1996). It is expressed through an organisation's strategic orientations and the attitudes and behaviours of its top managers (Anderson et al., 2009; 2015). Wiklund (1999) defines EO as '*the willingness of a firm to engage in entrepreneurial behaviour*' (p. 65). Miller (1983) identified three principal aspects to define EO : innovativeness, proactiveness and risk-taking. He provides a useful starting point by defining an entrepreneurial firm as one that '*engages in product-market innovation, undertakes high-risk activities, and is the first to come up with proactive innovations*' (Miller, 1983: 771). Innovativeness is defined as the organization's propensity to support the development of new ideas and initiatives that can generate new products, services, and technology. . Innovativeness has also been conceptualised as an organisational behaviour (see Salavou, 2004 for a review). Accordingly, entrepreneurial organisations are more attracted by unconventional products and services with high potential performance, which require specific resources and competencies (Covin and Slevin, 1991; Yongho et al., 2013). Proactiveness is a future-oriented perspective, which aims to anticipate future needs and to gain an advantage by developing opportunities in new ventures and markets (Hughes and Morgan, 2007; Lumpkin and Dess, 1996). The orientation towards been prepared for the future is considered a behaviour (Ohly and Fritz, 2010) as it affects the conduct and practices within the organisation. Due to their proactiveness, organisations are willing to encourage initiatives that lead to discovering and pursuing new opportunities and avoid threats from the external environment. Proactiveness is manifested through offensive strategies designed to introduce new products and detect opportunities before competitors do (Anderson et al., 2015; Filser et al., 2014). Finally, risk-taking is the willingness

to inject more resources into new ventures with high potential error costs and uncertain results (Wiklund and Shepherd, 2005). According to Miller and Friesen (1982), risk-taking is a managerial behaviour motivated by the hope of impressive results, despite difficulties and barriers.

EO depends largely on internal and external contingency factors. At the internal level, resource availability is a necessary condition for promoting such entrepreneurial behaviour. Thus, entrepreneurial organisations should possess or invest in resources and capacities to scan their environments and anticipate future changes. According to Covin and Slevin (1991), resource availability within an organisation is a major determinant in the creation and implementation of entrepreneurial behaviour. Such resources enable the development of strategic actions oriented towards innovativeness, proactiveness, and risk- taking. Some authors (Anderson and Eshima, 2013; Wiklund et al. al., 2010) have highlighted the role that intangible resources, such as intellectual property, specialised technologies, and reputation, play in differentiating an organisation's entrepreneurial activities from those of its competitors. EO is also the result of a synergy between internal dynamic capacities, such as adaptive capacity (Anderson and Eshima, 2016) and strategic reactivity (Green et al., 2008) and managerial behaviours oriented towards an entrepreneurial culture that promotes the detection of new opportunities and anticipates environmental changes (Baker and Sinkula, 2009). Among various external factors, research has highlighted the role of dynamism, uncertainty, product life cycle, and complexity (Cao et al., 2012; Wales et al., 2013). External networks and social capital also foster dynamism (Garcia-Villaverde et al., 2018; Rodrigo-Alarcon et al., 2018).

2.3 Scenario planning and innovativeness

Innovativeness is an important dimension of EO, providing a focus on new ideas and novelty, as well as a process for developing new products, services, and technology (Anderson et al., 2015; Lumpkin and Dess, 1996) Entrepreneurial organisations may incorporate knowledge and ideas from their past innovation experiences into future strategies and innovations. They often rely on dynamic and participative strategic tools to generate new solutions and deal with uncertainty (Anderson et al., 2015; Chahal et al., 2019).

Scenario planning is one of the tools that could be used to prepare the groundwork for actions related to innovativeness. It fosters innovation through the following stages: i) using a structural analysis to explore innovation by studying environmental factors, actors, and

interdependencies, in order to understand and analyse the system (O'Briens et al., 2013); ii) using training and transformation to concretise innovation by introducing new solutions and processes, taking into account expressed needs, constraints, and opportunities (Ramirez et al., 2020); and iii) evaluating the effects of innovation on the system (Roubelat, 2016).

Proponents of the scenario planning approach emphasise the role that scenarios play in innovation (Worthington et al., 2009; Westall, 2012) by applying systemic thinking beyond the possible and using scenario development to imagine future evolution (Lehr et al., 2017). This tool also enables organisations to manage and develop innovation competences via organisational learning (Bootz et al., 2019; Ramirez et al., 2020; Rhisiart et al., 2015), networking, and social capital (Lang and Ramirez, 2017). Scenario planning can be a part of an approach that enables organisations to manage and develop their innovation capacities by analysing the behaviour of actors and the impact of environmental variables. Since entrepreneurial behaviour is fostered through prospective analyses, which lead to the detailed study of potential threats (Heger and Rohrbeck, 2012; Worthington et al., 2009) our first hypothesis examines the relationship between scenario planning and innovativeness. We propose the following hypothesis (H1): *Scenario planning has a positive effect on innovativeness*.

2.3 Scenario planning and proactiveness

Organisational success has been found to be positively associated with proactiveness in pursuing new opportunities and/or minimising the thread of externalities (Crant, 2000)., In parallel, scenario planning as a tool challenges managerial perceptions of the environment by examining various trends and factors and their potential evolution (Chermack et al., 2006; Korte and Chermack, 2007). Based on strategic analyses, this method makes it possible to simulate the state of the system at a given moment through a detailed description, while studying the sequence of events and their interactions (Cairns and Wright, 2008). Scenario planning creates new challenges and strategic improvements (Worthington et al., 2009), enabling managers to anticipate the future by examining its driving forces and uncertainties (Bradfield et al., 2005). It is also a source of value creation, providing access to various resources (Rohrbeck et al., 2015).

Scenario planning improves cognitive dynamics and management beliefs in uncertain environments. Scenarios strengthen organisational flexibility by giving managers a clearer

vision of the future and changing how they think about it (Vecchiato, 2019). Cognitive dynamics relate primarily to mental models and strategic assumptions, which are advanced by challenging assumptions and developing scenarios (Chermack, 2006; Vecchiato, 2019). At an individual level, scenario development can influence the extent to which individuals engage in self-improvement and behaviour oriented toward changing rules, work roles, and methods. At the collective level, scenario development guides teams toward future-oriented behaviour, based on internal and external factors. We therefore examine the relationship between scenario planning and proactiveness, hypothesising that (H2): *scenario planning positively affects proactiveness.*

2.4 Scenario planning and risk-taking behaviour

Following this logic, various strategic-management and entrepreneurship studies emphasise the link between organisational innovation and uncertainty (e.g., de Guinea and Raymond, 2020; Verreynne et al., 2019; Roper and Tapinos, 2016). High uncertainty generates entrepreneurial strategies, which promote opportunity-seeking and adaptation to change (Honig and Samuelsson, 2020; Miller and Friesen, 1982), as managers confronting uncertainty become more risk-taking (Hoskisson et al., 2017). In the scenario-planning literature, Petrakis et al. (2016) echo Wack's (1985) view that scenario planning improves entrepreneurship, highlighting the role of disciplined imagination in anticipating uncertainties. Uncertainties enhance creativity, making it possible to identify and realise opportunities. By introducing scenario planning into the strategy-development process, managers can uncover new forms of competitiveness and sources of competitive advantage. Thus, managers consider uncertainty and risk to be part of the decision-making process. Scenarios are, among other things, responses to complex situations (Bouhalleb and Smida, 2020). Various events and types of behaviour may occur in scenario-planning interventions; these act on the mental models of participants, inducing them to make decisions beyond the possible, despite uncertain results (Bodwell and Chermack, 2010).

Scenarios also play a pedagogical role, as they are used to describe the future and to construct various images, which managers can assess. This process forces managers to ask difficult questions about ways in which the future could differ from the present and past (Ramirez et al., 2015). When leaders use this tool, their objective is not simply to describe uncertainties, but also to propose grids of analysis that differ from the current framework and align with their current mental models. Through this process, leaders learn to consider environmental

breakdowns and ways of implementing potentially risky solutions to change and control their environments. The present study examines the relationship between scenario planning and risk-taking behaviour by hypothesising that (H3): *Scenario planning positively affects risk-taking*.

3. Methodology

3.1 Research Design and data collection

To test our model, a national-level empirical study has been carried out on the healthcare sector in France. This sector was selected for two main reasons. Since the 1970s, the French healthcare sector has undergone radical changes, aimed at modernisation and innovation promotion through diversified funding. The sector incorporates a range of actors, including the state, private non-profit organisations, and the private sector. In addition, the healthcare sector faces a range of different constraints, involving financial resources, governance, and operator-size issues. At the same time, it provides opportunities in an environment that prioritises flexibility and decision-making adaptability (Bazillon, 2013).

Following an exhaustive literature review, a questionnaire was prepared and pre-tested with ten managers to eliminate statistical and semantic issues (Malhotra *et al*., 1996). Potential respondents were located through databases and professional and personal networks. A database of 981 potential respondents was compiled; individuals were contacted by email.

The initial email included a brief presentation, which explained the purpose of the research, and a detailed questionnaire, incorporating all variables in the study. The second email was a reminder, urging respondents to complete and return their questionnaires. Of the 146 returned questionnaires, only 133 could be used for the analysis, due to missing data. Overall, 60% of the respondents were women and 40% were men, aged between 45 and 55 years. Their average experience in the field was ten years and they occupied the following positions: health-service directors (53%), administrative managers (25%), and medical-service heads (22%). Their operations were principally related to managing i) nursing homes, ii) specialized clinics, and iii) hospitals in France.

3.2 Common method bias

As the data were collected from a single sample, specific practices were used to deal with common method bias. Based on the recommendations in Podsakoff *et al*. (2003), we ensured confidentiality and protected all personal data. The questionnaire was divided into sections based on latent variables, separated into small paragraphs (e.g., information acquisition, knowledge acquisition and dissemination, innovativeness, proactiveness, and risk-taking). We then conducted a factorial analysis of all items used in this analysis. Six factors emerged from the analysis with an eigenvalue greater than one and a cumulative variance of 72.08% (see Table 1).

Table 1 about here

3.3 Measures

The scenario-planning scale included twelve items derived from previous research (Bouhalleb and Smida, 2018). The scenario-planning process covers the preparatory, development, and use phases (e.g., O'Brien and Meadows, 2013). The construct was therefore measured using items related to three dimensions, as follows. (1) information acquisition measures the organisation's efforts to scan the environment to determine trends and uncertainty. Respondents rated various opinions on the need to adapt to the business environment, using formal and informal means to stay better informed and to update their views on the environment. (2) Knowledge acquisition and dissemination were measured using five items related to the organization's orientation towards developing new ideas and approaches, R&D development, and ways of integrating external flows of knowledge and disseminating them throughout the organization. These two constructs (information acquisition and knowledge acquisition and dissemination) describe the preparatory phase, which aims to understand the organisation and its environment. (3) Scenario

planning and strategic choices were measured using four items related to the development and use phases. Items concerned the impact/uncertainty matrix, the nature of developed scenarios, scenario-based strategic choices, and finally the confrontation between such choices and possible futures. Respondents rated the items using a seven-point Likert scale, with responses ranging from 1 (totally disagree) to 7 (totally agree). As previously discussed, EO is characterized by innovative, proactive, and risking-taking activities. In line with the entrepreneurship literature, we have conceptualized EO through three dimensions and measured innovativeness using three items. This dimension assesses the extent to which an organisation is oriented toward developing new products, services, or innovative processes. Proactiveness is measured using three items related to taking the initiative, identifying opportunities, and initiating actions.

Risk-taking was based on three items that measured the extent to which organizations encouraged their employees to take risks, develop a risk-taking attitude, and search for opportunities through exploration and experimentation. All of the items used to measure constructs were adapted from Hughes, while Morgan's Scale incorporated seven-point Likert scales, with responses ranging from 1 (totally disagree) to 7 (totally agree). (Hughes and Morgan, 2007). Table 2 summarises the measurement items.

Table 2 about here

3.4 Model estimation

To test the research hypotheses, we used a structural equation-modelling (SEM) approach with partial least squares (PLS). PLS-SEM simultaneously estimates all paths, making it possible to deal with biased and inconsistent parameter estimates (White et al., 2003). The use of this method in place of covariance-based (CB) SEM was justified by the study objective, which aimed to predict and construct theory (Hair et al., 2011). According to Hsieh et al. (2006), this approach is flexible; it facilitates an understanding of the relationships between constructs and the predictive power of the latent variable. This method is highly recommended in cases with a low level of model development. Subsequent research has shown that entrepreneurial orientation can be influenced by several factors, some confirmed and others awaiting

exploration.. Finally, this method is suitable for testing models with small samples (Chin, 1998), as it deals with the potential limit of the normal distribution of measures (Esposito Vinzi et al., 2010).

4. Findings

4.1 PLS-SEM results

To evaluate the reliability and validity of the measurement model, we interpreted the factor loadings, Cronbach's alpha (α) value, composite reliability (CR), and average variance extracted (AVE). All items loading and their respective t-values were significant. The Cronbach's alpha values were found to vary between 0.8 and 0.84, while the composite reliability estimates ranged from 0.86 to 0.91, both confirming reliability (Hair et al., 2010). The AVE values were above the standard of 0.5 (Fornell and Larcker, 1981), as shown in Table 3.

Discriminant validity was assessed by comparing the square root of the AVE for each construct with those of other constructs, and determining that it was higher than its correlation coefficients (Fornell and Larcker, 1981). Table 4 presents the square root of AVE in the diagonal, while the rest of the values correspond to the correlations for each pair of constructs; the correlation values are smaller than the ones in the diagonal, thus confirming discriminant validity (Table 4).

Finally, multi-collinearity was verified through the variance inflation factor (VIF). The VIF value for each variable ranged from 1.480 to 3.344, well below the typical threshold value for the VIF index of 10, suggesting that the proposed model was free of multi-collinearity.

Table 3 about here

Table 4 about here

4.2 Structural model and hypothesis testing

Having validated the measurement model, we proceeded to test the structural model using SmartPLS 3.0. A bootstrapping analysis with simulation of n= 5,000 resamples was carried out to test our hypotheses. The results of this analysis are presented in Table 5, which shows that the effect of scenario planning on innovativeness was not significant (β= 0.143, t= 0.937) and H1 was not supported. However, H2 was supported (β=0.337, t= 3.908), proving that scenario planning has a positive impact on proactiveness. Finally, the results revealed a significant effect of scenario planning on risk-taking, confirming H3 (β=0.244, t= 2.755).

Figure 2 about here

Table 5 about here

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5. Discussion

5.1 Theoretical contributions

This research shows that scenario planning, which is typically used to make sense of uncertainty and/or to develop strategy, has the additional effect of positively influencing entrepreneurial orientation. Consecutively, our research confirms previous exploratory work (De Smedt et al., 2013; Sarpong and Maclean, 2011). Analytically, our findings show that risk-taking and

proactiveness are significantly affected by scenario planning, while innovativeness is not. This suggests that scenario planning helps organisations make better sense of future uncertainties and acquire learning, enabling higher levels of calculated risk-taking. The risk-taking characteristic can also be explained by the increased levels of proactiveness. In other words, scenario planning creates the perception that an organisation's intervention results make it more resilient to future change by determining which key uncertainties and trends must be monitored. The perception that the future, its uncertainties, and their causal relationships are better understood creates organisational confidence in preparing for the future. Instead of focusing on short-term planning horizons, the organisation can take proactive measures to avoid threats, while exploring riskier opportunities.

Based on the existing literature (Derbyshire and Giavannetti, 2017), it seems clear that organisations do not undertake scenario planning to become more risk taking or entrepreneurial. To our knowledge, however, this study is the first to show empirically that both are scenario-planning outcomes. Our findings indicate that preparedness and risk-taking behaviours, as EO components, are unintended and indirect affordances of scenario planning as strategy tool (Ramirez et al., 2020). This result makes an important contribution to the wider strategy-tool literature (Jarzabakowski and Kaplan, 2015). Particularly in the field of strategy affordances (Demir, 2015), we show that risk-taking and entrepreneurial behaviours are the outcomes of a tool used while strategizing. Thus, unintended affordances can be created, even via highly structured strategy tools (Burke and Wolf, 2020), such as scenario planning.

The unintended outcomes of scenario planning are of particular interest because some can have a negative impact on organisations. Improving entrepreneurial orientation overall can be considered a positive outcome for every organisation. However, Hodgkinson and Wright (2004) and Burt et al. (2015) have shown that the unintended outcomes of scenario-planning interventions can have a negative impact on the intervention overall. For this reason, we cannot say that risk-taking behaviour is always a desired outcome. Previous research (Wiseman and Gomez-Mejia, 1998) has shown that risk-taking and risk-averse behaviours must be aligned with organisational culture or strategically managed as change.

Interestingly, the scenario-planning users in this survey, despite being proactive and risk taking, did not exhibit higher levels of innovation-related behaviour, as we had hypothesised from the literature. Of the few empirical studies linking scenarios and innovation, von der Gracht and Stillings (2013) mention an adapted variation on scenario planning, which was used exclusively to improve innovation. Chermack et al. (2015) show that levels of innovation in organisations

that use scenario planning are affected by their cultures. Trying to explain the finding of our research, one possible explanation about to the lack of innovativeness between scenario planning users in our survey is a result of this study's context. Specifically, previous studies (Angeli and Jaiswal, 2016; Mintzberg, 2017) have found that the healthcare industry is characterised in general by low levels of innovation. As Herzlinger (2006) has observed, the US healthcare industry, '*despite the enormous investment in innovation and the magnitude of the opportunity for innovators to both do good and do well*', exhibits a significant level of failure, due to the large number of institutional forces that act as barriers. At the same time, Kimble and Massoud (2017) have identified a great many factors that make it difficult to innovate in the healthcare industry. Moreira et al., (2017) have revealed a paradox in the healthcare industry: increased levels of innovativeness are not correlated with improved performance, suggesting that innovativeness functions in a dramatically different way in healthcare than in other industries.

Previous research has shown that entrepreneurial orientation is positively associated with emergent (as opposed to planned) strategies (Covin et al., 2006). At the same time, scenario planning is a tool, associated in the strategic-management literature (Mintzberg et al., 1998) with the planning school-of-thought strategy-making. The scenario planning literature largely dismisses Mintzberg's view; it views scenario planning as a tool that creates shared mental models for collective sensemaking (Tapinos and Pyper, 2018), affects cognition (Land and Ramirez, 2017), and improves organisational learning (Chermack et al., 2006). At the individual level, Chermack and Van der Merwe (2003) note that scenario planning provides a framework for learning, which considers the individual construction of knowledge, participant influences on individual assumptions, and the contextual requirements for building knowledge and reality. It encourages organisations to behave entrepreneurially by introducing uncertainty into their frame of analysis. At the same time, Anderson et al. (2009) show a strong relationship between entrepreneurial orientation and organisational learning, since entrepreneurial orientation increases with the acquisition of knowledge. Thus, the learning character of scenario planning interventions explains how and why scenario planning has a positive effect on entrepreneurial orientation.

The existing literature focuses, to a large extent, on the effects of entrepreneurial orientation on firm performance (e.g. Basco et al., 2019; Jiang et al., 2018; Shan et al., 2016). Admittedly, the relationship between entrepreneurial orientation and performance is an important topic because it allows the effect of an entrepreneurial posture on organisational and financial performance to be measured. The main challenge, however, is understanding how this entrepreneurial behaviour develops within organisations. Is it related to strategic or organisational factors within the company and its culture? What contribution does the individual make at this level?

Some authors distinguish between individual entrepreneurial orientation, which refers to attitudes and behaviours, and organisational entrepreneurial orientation, which refers to company culture (Covin and Wales, 2019). Entrepreneurial orientation is a strategic decision-making process, determined by the nature of managerial practices and their philosophies (e.g. Green et al., 2008; Gao et al., 2019). According to Anderson et al. (2009), entrepreneurial orientation is associated with two factors: entrepreneurial behaviour and managerial attitude. A firm's entrepreneurial actions may therefore manifest through proactive behaviour and venturing to create strategic change. Such change renews pre-existing relationships, either among actors within the organisation, or between the organisation and the external system. Both types of change involve creativity and innovative solutions.

At the organisational level, scenario planning is one way, among others, to guide proactive capabilities. It functions like a 'radar' (Bodwell and Chermack, 2010; Schoemaker et al., 2013), enabling decision-makers to detect market opportunities. This tool's most important function is to challenge managers' assumptions about the current situation, their environment and how it works, relationships between stakeholders, and similar factors. Scenario planning allows decision-makers to change their image of reality and propose consistent stories about the future. The revolutionary nature of scenario planning also enables managers to develop organisational learning through strategic conversations (Chermack and Van der Merwe, 2003).

5.2 Contributions to practice

The findings of the present study have direct implications for practitioners. To design effective workshops and interventions within organisations, it is important to understand that scenario planning affects risk-taking behaviour. An increase in risk-taking behaviour is not a strategic

option, but a behavioural characteristic, which affects all decisions made. Organisations that seek to change their cultures and become more risk-taking can achieve that goal by engaging with uncertainty: capturing, understanding, and anticipating uncertainty, while making sense of the future as multiple plausible images, instead of linear single-point forecasts.

At the same time, anticipating the future through scenarios improves proactiveness. The process of scenario-planning helps managers engage with longer planning horizons than could be accessed using traditional planning techniques. As a result, organisations that engage in scenario-planning go beyond five-year plans, regardless of their industry characteristics, and prepare for a more diverse set of future worlds. Firms using scenario planning to improve innovativeness behaviour should use a scenario method that has been adjusted for innovation (von der Gratch and Stilling, 2012) or combine scenario planning with other tools that support innovation creation.

This research confirms that scenario planning is tool that practitioners can rely on when developing strategy. Since entrepreneurial orientation is positively associated with corporate entrepreneurship (Lumpkin and Dess, 1996; Dess and Lumpkin, 2005), we deduce that scenario planning interventions can support organisational renewal and develop new products, services, and processes that will improve organisational performance (Ireland, Covin & Kuratko, 2009).

The specificities of this industry require organisational skills that foster both adaptability and agility—enabling organisations to meet the requirements of users whose requests evolve continuously. This research therefore has a participative purpose, promoting the joint reflection of various stakeholders in this sector on ways to adapt current practices to a changing world.

In addition, our research provides new insights into the entrepreneurial-orientation drivers (associated with the environment, organisational processes, methods, and styles) that firms use to act entrepreneurially (Covin et al., 2006). The results of this study propose scenario planning as a determinant of entrepreneurial orientation. To promote this strategic stance within an organisation, companies must change and develop aspects of organisational structure, such as decentralisation and inter-departmental communication. In addition, companies are called on to introduce flexibility to facilitate adaptation to change. Scenario planning fosters entrepreneurial orientation by developing creative thinking and determining key variables. This strategic stance helps organisations develop a proactive spirit and pursue business opportunities. We therefore suggest that leaders introduce this planning tool into the decision-making process to cope with

rising uncertainty and accelerating change. Finally, it would certainly be desirable for leaders to recognise the importance of entrepreneurial orientation in contemporary business.

5.3 Limitations and future research

This study has some limitations. First, our sample was drawn from a single country and sector; this can affect the generalisation of the results to other contexts. Institutional characteristics and managers' behaviour depend on the context and degree of environmental uncertainty. Future researchers could extend these findings by focusing on samples from other countries or sectors. Researchers could also use a qualitative approach to explore scenario-planning practices within firms and their impact on entrepreneurial behaviour. Subsequently, many other factors, such as organisational learning and culture, which affect both scenario planning and entrepreneurial orientation, could enrich this analysis. In particular, we call for more research on the relationship between scenario planning and innovativeness.

6. Conclusion

This study has investigated the impact of one of the most popular strategy tools, scenario planning, on a key emerging concept in the field of entrepreneurship: entrepreneurial orientation. Its starting point was the lack of research on scenario-planning outcomes. Despite numerous conceptual propositions, there is a distinct lack of empirical evidence. The present study has used quantitative data from a single industry to determine whether the use of scenario planning affects entrepreneurial orientation, as determined by behaviour associated with innovativeness, proactiveness and risk-taking. The results of our analysis show that, while risk-taking and proactiveness are positively affected by scenario planning, innovativeness is not. The findings can be viewed and interpreted in two ways: firstly, this is the first study to demonstrate empirically that scenario planning affects the entrepreneurial orientation of large organisations. This is a significant finding, as most previous research has looked at the development of strategy as an outcome of scenario interventions, without considering entrepreneurial orientation. Secondly, this is the first study to demonstrate empirically that entrepreneurial orientation is positively associated with the use of a strategy tool like scenario planning. This is an equally important finding, as it reveals that entrepreneurial orientation can

be affected by strategy tools – and particularly those that examine uncertainty, a key influencer of corporate entrepreneurship.

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Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,714	27,210	27,210	5,714	27,210	27,210
2	3,478	16,561	43,770	3,478	16,561	43,770
3	2,203	10,491	54,261	2,203	10,491	54,261
4	1,507	7,178	61,439	1,507	7,178	61,439
5	1,198	5,705	67,144	1,198	5,705	67,144
6	1,037	4,939	72,083	1,037	4,939	72,083
7	,799	3,804	75,886			
8	,736	3,503	79,390			
9	,600	2,857	82,247			
10	,532	2,534	84,781			
11	,506	2,407	87,188			
12	,411	1,958	89,146			
13	,379	1,805	90,950			
14	,366	1,741	92,692			
15	,332	1,580	94,271			
16	,284	1,352	95,623			
17	,222	1,058	96,682			
18	,195	,930	97,612			
19	,191	,910	98,521			
20	,164	,782	99,303			
21	,146	,697	100,000			

Extraction Method: Principal Component Analysis.

Table 1: Factor analysis, total variance explained

Variables	**Measurement items**	Factor Loading	**Mean**	**SD**

Scenario planning				
Information acquisition (SP_INFO)	SP_INFO1. We constantly evaluate the need to adapt to the business environment.	.81	4.62	1.51
	SP_INFO2. The members of the organisation use formal and informal means to learn about the most recent events regarding the market or environment.	.91	4.65	1.54
	SP_INFO3. We systematically examine and update our opinion about the business environment.	.89	4.65	1.56
Knowledge acquisition and dissemination (SP_KNOW)	SP_KNOW1. New ideas and approaches to work performance are tested continuously.	0.83	4.41	1.39
	SP_KNOW2. There is a consolidated and resourceful R&D policy.	0.70	4.31	1.35
	SP_KNOW3. We always acquire knowledge from external sources and benchmark competition.	0.81	4.52	1.36
	SP_KNOW4. We acquire knowledge from external sources and our main competitors.	0.81	4.53	1.37
	SP_KNOW5. We can swiftly disseminate knowledge in our firm.	0.77	4.66	1.39
Scenario planning and strategic choices (SP_SCENARIO)	**SP_SCENARIO1**. We define the impact/uncertainty matrix and determine the key scenario factors.	0.69	4.70	1.15
	SP_SCENARIO2. Developed scenarios connect past, present, and future events.	0.88	4.80	1.30
	SP_SCENARIO3. We offer strategic choices based on the developed scenarios.	0.88	5.08	1.20
	SP_SCENARIO4. We confront the strategic choices with the different possible futures.	0.74	5.19	1.06
Entrepreneurial Orientation				
Innovativeness (INNOV)	INNOV1. We actively introduce improvements and innovations in our organisation.	0.87	4.95	1.25
	INNOV2. Our organisation is creative in its methods of operation.	0.92	4.95	1.20
	INNOV3. Our organisation seeks out new ways to do things.	0.77	5.12	1.2

Risk-taking (RISK_T)	RISK1. The term 'risk-taker' is considered a positive attribute for people in our organisation.	0.88	5.05	1.13
	RISK2. People in our organisation are encouraged to take calculated risks with new ideas.	0.90	5.02	1.20
	RISK3. Our organisation emphasises both exploration and experimentation for opportunities.	0.97	5.18	1.06
Proactiveness (PROAC)	PROAC1. We always try to take the initiative in every situation (e.g. in projects and when working with others).	0.80	5.15	0.99
	PROAC2. We excel at identifying opportunities.	0.86	5.09	1.17
	PROAC3. We initiate actions to which other organisations respond.	0.87	5.13	1.10

Table 2. Measurement items

Constructs	**Items**	**Cronbach's alpha**	**CR**	**AVE**
SP_INFO	3	0.85	0.91	0.77
SP_KNOW	5	0.84	0.89	0.64
SP_SCENARIO	4	0.81	0.88	0.64
INNOV	3	0.82	0.87	0.73
PROAC	3	0.8	0.87	0.70
RISK_T	3	0.82	0.89	0.74

Table 3. Reliability and convergent validity

	1	**2**	**3**	**4**	**5**	**6**
1.INNOV	0.845					
2.PROAC	0.51	0.841				
3.RISK_T						

	0.439	0.510	0.863			
4.SP_INFO	0.122	0.340	0.292	0.878		
5.SP_KNOW	0.083	0.157	0.068	0.502	0.789	
6.SP_SCENARIO	0.123	0.294	0.220	0.322	0.221	0.805

Table 4. Discriminant validity

Path relationship	PLS regression result	Robust path analysis result (Bootstrapping = 5000 times)		95% BCa confidence interval	
	Coefficient (SE)	Coefficient (SE)	p-value	Low limit	Upper limit
Direct effects:					
Scenario Planning → INNOV	0.143	0.143 (0.95)	0.17	–0.101	0.393
Scenario planning →RISK_T	0.288	0.244 (2.671)	0.004	0.081	0.382
Scenario Planning → PROAC	0.394	0.337(4.067)	0.000	0.189	0.462

Table 5. Path coefficients

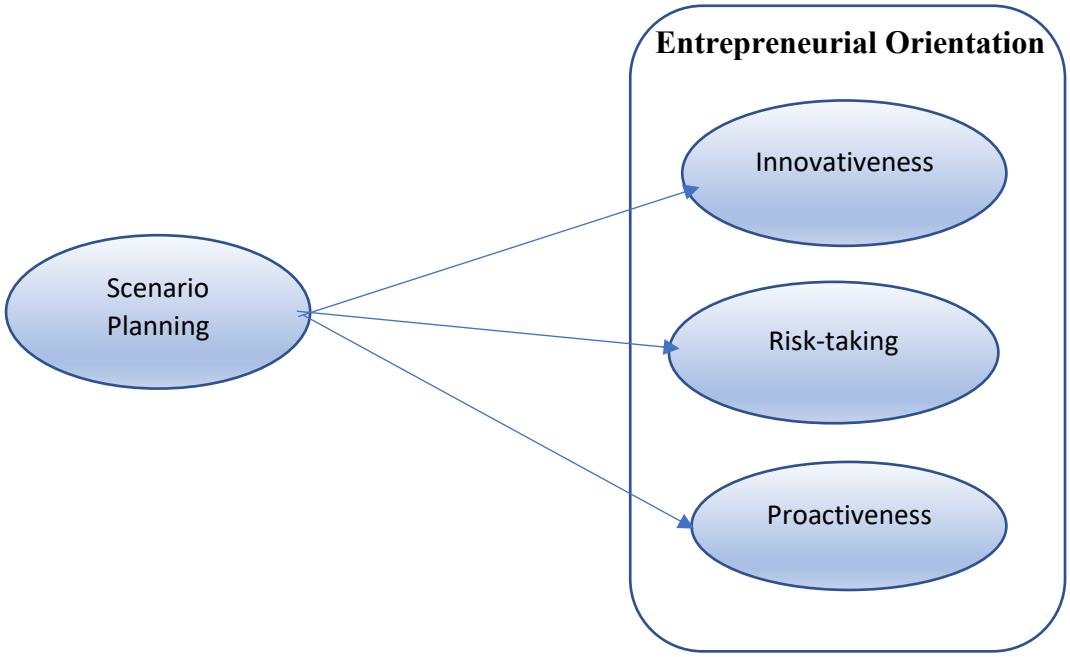

Figure 1: Conceptual Model

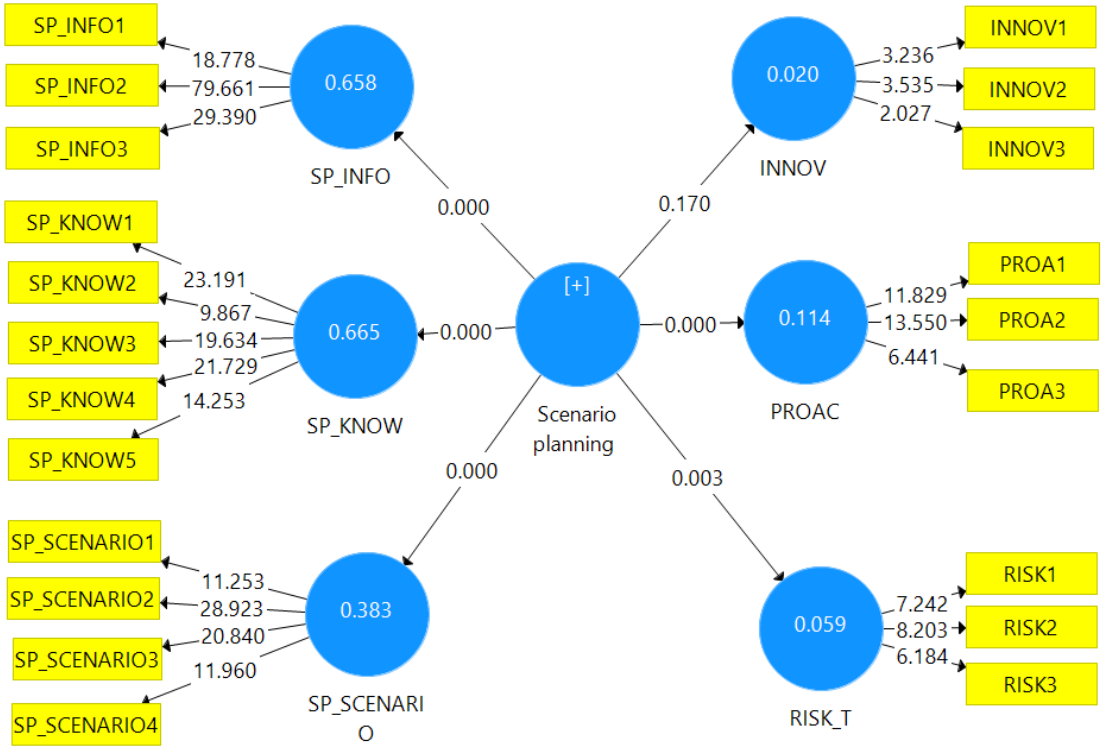

Figure 2. Overview of structural model results