



Strategic foresight and business model innovation: The sequential mediating role of sensemaking and learning

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ABSTRACT

Foresight is fundamental to strategy scholarship and can affect organizational outcomes such as innovation. However, few attempts have been made to link foresight with business model innovation (BMI). Therefore, it remains empirically unclear whether and through which mechanisms strategic foresight influences BMI development. To address these shortcomings, this study analyzes the direct effect of strategic foresight on BMI and the mediating effects of sensemaking and learning. The data were derived from surveying a sample of senior managers at 146 Finnish organizations (both large firms and SMEs) and the analysis was conducted by applying structural equation modeling. The findings provide evidence of a direct association between strategic foresight and BMI and suggest a partial mediating effect of learning and, more importantly, sequential mediating effects of sensemaking and learning. This study offers valuable insights into the relationships among BMI, strategic foresight, sensemaking, and learning. It enriches theory and practice by providing empirical support for the direct effect of strategic foresight on BMI, uncovering the multifaceted roles of the mechanisms that influence BMI, and proposing a model that could help managers handle barriers to BMI robustly and systematically.

1. Introduction

Environmental shifts brought about by disruptive technologies; new competitors; and contemporary, dynamic, and uncertain business environments call for continuous innovation and *business model (BM)* transformation (Ancillai et al., 2023; Şimşek et al., 2022; Egjford and Sund, 2020; Kraus et al., 2020; Zhang et al., 2023; Trischler and Li-Ying, 2023). According to contingency theory (Venkatraman and Prescott, 1990), these environmental changes are highly unpredictable. Therefore, the gradual adaptation of BMs may be insufficient in such circumstances (Saebi, 2015). Consequently, these changes prompt a fundamental reconfiguration of the meta-routines of value creation, proposition, and capture (Teece, 2010; Zott and Amit, 2010; Clauss, 2016).

However, despite its importance, the pursuit of *business model innovation (BMI)* is challenging and not all organizations succeed in renewing their BMs. Difficulties arise from the complexity of the configurations of interdependent BM components and uncertainty of the effectiveness of a new BM (Baden-Fuller and Mangematin, 2013; Berends et al., 2016). Furthermore, the forces of cognitive inertia challenge BMI in established organizations. For example, an existing BM that

shapes managerial mental models may distort the perception and sensing of novel opportunities (Bouchikhi and Kimberly, 2003; Martins et al., 2015). Similarly, structural inertia may also occur. Internal resistance to BMI may stem from hesitancy in allocating resources to BMI, avoidance of making changes to an existing BM, and organizational conflicts between old and new BMs (Chesbrough and Rosenbloom, 2002; Chesbrough, 2010; Doz and Kosonen, 2010). These challenges indicate that we know little about the tools and systematic approaches that organizations can adopt to maintain and increase their capacity to pursue BMI (Huang and Ichikohji, 2023). If this remains unsolved, it will prevent organizations from radically changing their value creation, proposition, and capture activities.

Varum and Melo's (2010) systematic literature review and Worthington et al.'s (2009) study on product and service innovations revealed that strategic foresight can be pivotal in achieving desired organizational outcomes such as innovation. Strategic foresight is an approach that requires multiple structural organizational units to systematically refocus their lenses to identify, observe, and interpret emerging trends and weak signals of change, especially those that might not be sensed by normal corporate sensors or that use its dominant search logic (Ruff, 2015). In addition, it allows us to analyze the future

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evolution and impact of these trends on the organization (Vecchiato, 2015; Day and Schoemaker, 2019; Gavetti and Menon, 2016). This urges organizations to detect available response options and quickly gather necessary resources, enabling them to overcome inherited conventional ideas, strategic beliefs, and mental models (Bowman, 2016). Consequently, strategic foresight enables the creation of a flexible organizational structure, accelerates cognitive processing, and encourages creativity within an organization (Costanzo, 2004; Patvardhan and Ramachandran, 2020), which may enhance BMI's capability to innovate and implement change processes in a structured and systematic fashion.

While existing literature (Von der Gracht et al., 2010) suggests the potential of strategic foresight to support BMI conceptually, to the best of our knowledge, no study has explicitly explored the connection between these constructs or provided empirical evidence of the nature of their relationship. Although strategic foresight may directly affect and promote BMI, thorough knowledge and detailed evidence of the underlying mechanisms that link strategic foresight to innovativeness (Adegbile et al., 2017; Sarpong and Meissner, 2018; Yoon et al., 2017; Gordon et al., 2020) to support this theory are lacking. The extant research indicates that strategic foresight and BMI develop in silos. The findings from previous qualitative studies show that foresight broadens *sensemaking* to explore and comprehend assumptions about the future and enhances the cognitive capacity to perceive, interpret, and respond to change (Wright et al., 2013; Iden et al., 2017). Concerning BMI, it has been argued that sensemaking is vital when introducing and interpreting innovative ideas and creating a collective understanding of how BMs can be innovated (Andreini et al., 2021; Friesl et al., 2019; Gattringer et al., 2021). In addition, prior research has highlighted that strategic foresight triggers and accelerates *learning* (Bootz et al., 2019; Marinković et al., 2022) and facilitates the exploration and exploitation of new opportunities (Cunha et al., 2006; Boe-Lillegraven and Monterde, 2015). Similarly, numerous studies in different contexts have identified BMI as an outcome of explorative and exploitative learning (Sosna et al., 2010; Mezger, 2014; Andries et al., 2013; Schneckenberg et al., 2022).

Therefore, although earlier research suggests that sensemaking and learning are relevant factors in strategic foresight (Gordon et al., 2020; Schoemaker and Day, 2021; Marinković et al., 2022; Fergnani, 2022) and BMI (Massa and Hacklin, 2020; Wirtz, 2020; Andreini et al., 2021; Schneckenberg et al., 2022; Loon and Quan, 2020; Massa and Tucci, 2021) and can justify the nature of their relationship, no systematic or theoretic research has thus far examined their overall interaction. That is, they have not been examined as part of a single model and their degree of relationship has not been empirically measured. More importantly, rigorous empirical evidence and systematic research on mediating variables with key constituents in the field of BMI research are lacking (Foss and Saebi, 2017; Schneider and Spieth, 2013; Björkdahl and Holmén, 2013; Amit and Zott, 2015). Therefore, this study aims to gain insights into this topic and take a significant step toward a richer understanding of BMI in organizations by answering the following research question: *How does strategic foresight relate to BMI?*

The originality and value of this study is that it provides empirical evidence of the theoretical gap between strategic foresight and BMI. To understand how strategic foresight influences BMI, this study develops and empirically examines a research model of the direct linkage between strategic foresight and BMI and the mediating effects of sensemaking and learning, which form the constituents of the indirect connections between the two. This study adds to the less-researched aspect of BMI by providing insights into the underlying mechanisms that account for the effects of strategic foresight on BMI and explicating how they can be leveraged to pursue BMI. These new insights and implications could contribute to a generation of more robust BMI theories and effective BMI practices (Foss and Saebi, 2017; Amit and Zott, 2015).

The results from the structural equation modeling analysis of the survey responses of senior managers at 146 organizations in Finland confirm that strategic foresight plays a positive role in advancing BMI. This finding contributes to the literature by explicitly noting the

previously ignored relationship between strategic foresight and BMI and how foresight can interact with effects and foster BMI. Our results extend these theories by unveiling the complex roles played by sensemaking and learning. That is, learning itself and sensemaking and learning sequentially mediate the relationship between strategic foresight and BMI. These findings are consolidated into a model that explicitly illustrates the functions of the underlying mechanisms that tune strategic foresight efforts for BMI and thus empirically demonstrates the elements that researchers often discuss but rarely evaluate. From a managerial perspective, our findings provide practicing managers with a model that guides them on how to optimize their BMI efforts and better understand the interaction effects of its underlying mechanisms in organizing BMI practices, which, in turn, helps lower or eliminate BMI barriers.

The remainder of this paper is organized as follows. First, we present the theoretical underpinning of the study and develop the hypotheses. Subsequently, we evaluate and test the conceptual model, which produced several findings. Finally, we discuss the theoretical and practical implications of these findings as well as their limitations and future research directions.

2. Theoretical background and hypotheses development

2.1. Business models and business model innovation

BM is a new unit of analysis in strategy research, as they are a more useful concept for capturing competitive advantage than the simpler, static, and firm-oriented view of traditional strategy (Snihur and Eisenhardt, 2022). Bigelow and Barney (2021) posited that BMs, owing to their emphasis on interdependencies and multilateral connections, enrich strategy. This provides insights into the complexity of the increasingly interdependent environment in which businesses must compete. Similarly, Lanzolla and Markides (2021) argued that BMs provide a novel lens for developing theories in strategy. That is, such models include insights into which activities to connect with and how to develop notable interdependencies among activities that build superior strategies. To build competitive advantage, activities should be configured to be internally consistent and fit the organization's environment, thereby allowing it to respond to environmental changes quickly (Lanzolla and Markides, 2021). Therefore, well-defined, novel, and effective BMs are crucial and can be both strategic (i.e., proffering value capture and competitive advantage) and organizational (i.e., involving the organizational structure and process that creates value) (Snihur and Eisenhardt, 2022; Casadesus-Masanell and Ricart, 2010; Filser et al., 2021).

BM describes how firms conduct business, representing a system of interdependent intra- and extra-organizational activities and the logic of creating, proposing, and capturing value (Zott et al., 2011; Spieth et al., 2014; Massa et al., 2017; Zott and Amit, 2010). Value creation refers to how a firm creates value for all parties involved in transactions using its internal and external resources and capabilities. Value proposition, which is customer-centric, refers to ways of offering value and specifies the articulation of business activities. Value capture covers the financial means used to monetize the proposed value and generate profit (Baden-Fuller and Mangematin, 2013; Clauss, 2016; Magretta, 2002; Amit and Zott, 2015; Kraus et al., 2020; Lüthge et al., 2021).

BM is an essential concept for coping with technological disruptions and strategic discontinuities that tighten global competition and the substantial volatility and uncertainty in the business environment (Doz and Kosonen, 2010; Voelpel et al., 2004; Huang and Ichikohji, 2023; Trischler and Li-Ying, 2023). Similarly, factors such as increased firm specialization and new capabilities, market internationalization, and changing customer needs accentuate the importance of renewing BMs (Björkdahl and Holmén, 2013). BM is therefore a strategic change at the firm level that incorporates *new ways of creating value* (e.g., through the development of new capabilities, technologies or equipment, processes

or structures, and new partnerships), suggests *new ways of capturing value* (e.g., through new revenue models and cost structures), and defines *new value proposition* mechanisms (e.g., through new offerings, customer segments/markets, and distribution channels) (Afuah, 2014; Baden-Fuller and Mangematin, 2013; Clauss, 2016; Zott et al., 2011; Teece, 2010; Åström et al., 2022). Successful BMI requires interplay among these three dimensions (Kraus et al., 2020). Regarding innovation (Massa and Tucci, 2014), BMI has been applied both as an *instrument* for commercializing new ideas, products, and technologies (Chesbrough and Rosenbloom, 2002) and as a *source of innovation* itself (Foss and Saebi, 2017; Zott et al., 2011). Therefore, it is crucial for generating value and building long-term sustainable competitive advantage before current BMs become obsolete or unprofitable (McGrath, 2010; Sosna et al., 2010).

Nonetheless, the BM renewal process requires considerable time, effort, and careful attention, as it is highly demanding and can be easily hindered. Structural barriers can emerge when the new BM conflicts with the organization's current assets and processes (routines). Resistance to change may arise because of the required extra time, knowledge, costs, resources, and risks involved as well as the radical restructuring of processes (Chesbrough, 2010; Olsen and Boxenbaum, 2009; Bouchikhi and Kimberly, 2003). This is especially evident when outcome uncertainty is high (Andries et al., 2013; Moqaddamerad and Tapinos, 2022). Consequently, neglecting or failing to completely comprehend the value of new technologies, combined with the inability to understand when a new BM is needed and how to allocate sufficient resources to develop and exploit that new BM, can deter BMI (Bereznoy, 2017). Cognitive barriers may also exist. BMI inevitably requires changes inside the organization, which naturally leads to resistance by the affected units owing to path dependency. There may be confusion about how to reframe the established logic of value creation, proposition, and capture in the presence of many feasible options (Chesbrough and Rosenbloom, 2002). The conflicting dominant mindsets or logics of key players (e.g., how things work and where to allocate critical resources) (Bouchikhi and Kimberly, 2003; Martins et al., 2015) can prevent new perspectives and "outside-the-box" thinking. This can result in key players downplaying the new BM's benefits and/or subconsciously filtering and erasing the factors that do not fit in the current BM (Rüb et al., 2017). Additionally, the cognitive burden of simultaneously managing multiple BMs can challenge organizations during transitional periods (Chesbrough, 2010; Olsen and Boxenbaum, 2009; Berends et al., 2016).

Thus far, to address barriers to BMI, management research has suggested coping mechanisms such as learning from experimentation (e.g., Andries et al., 2013; McGrath, 2010; Sosna et al., 2010) and developing organizational agility (e.g., Doz and Kosonen, 2010; Battistella et al., 2017). However, in this study, we suggest that strategic foresight can inspire and guide BMI and help overcome its barriers, especially in dynamic environments. This approach enhances our understanding of BMI development by investigating its influencing mechanisms that can raise barriers to innovation (Amit and Zott, 2015), thereby improving our understanding of the configurations, enablers, and boundary fields of BMI (Filser et al., 2021; Kraus et al., 2020).

2.2. Strategic foresight

The environmental instability triggered by rapid technological shifts creates managerial challenges in restructuring, designing, and managing resources. Organizations should develop foresight to cope with these challenges (Schoemaker and Day, 2021; Ferngani, 2022; Bereznoy, 2017; Rohrbeck et al., 2015). It has been argued that foresight is fundamental to strategy and management scholars, as it aligns with the

contingency theory of the firm. One such contingency factor is the dynamism and complexity of the external environment, which shapes managerial choices and abruptly impels organizations to promote strategic foresight to increase their future preparedness and regain fit by developing new processes and implementing dynamic procedures and techniques (Ferngani, 2022; Donaldson, 2001).

Relatedly, strategic foresight, at the intersection of foresight and strategy, is viewed as the product of foresight methods and tools that use unique processes and activities to provide input into strategic planning and decision-making (Van der Laan, 2021; Iden et al., 2017; Voros, 2003; Darkow, 2015; Ehls et al., 2022; Vecchiato and Roveda, 2010) by "creating and maintaining high-quality coherent and functional forward views and using the insights arising in organizationally useful ways" (Slaughter, 1997, p. 13). Gavetti and Menon (2016) viewed strategic foresight as identifying a course of action noticeably different from routine and farsighted innovation strategies and their possible outcomes within a defined boundary. Gordon et al. (2020) spearheaded the application of strategic foresight methods in organizations to fulfill their needs and succeed. They advocated the integration of foresight knowledge into innovation processes. Rohrbeck and Gemünden (2011) identified three ways in which strategic foresight can enhance an organization's innovation capacity: 1) exploring new business domains by identifying emerging technologies and customer needs, 2) expanding the number of innovative ideas and restructuring internal processes to achieve goals, and 3) increasing innovation input quality through challenging research and development (R&D) projects and continuously benchmarking innovation initiatives. Strategic foresight methods (e.g., scenario planning) enable organizations to facilitate proactive attitudes toward environmental changes, detect sources of competition, and respond promptly to them (Vecchiato, 2012; Yoon et al., 2017).

Strategic foresight can be approached by considering various stages. The *foresight framework* introduced by Hines and Bishop (2013) and Hines (2020) provides one useful representation. The process begins by *framing* the goal and scoping the domain to be investigated because of the strategic problem (e.g., identifying new customer needs, technologies, market opportunities, and new BMs). This stage also includes assessing the current domain status, addressing pertinent future perspectives, and providing a focus or boundary (Mintzberg et al., 1976; Hines and Bishop, 2013; Fraser and Ansari, 2021; Gavetti and Menon, 2016). The second stage, *scanning*, aims to collect information from the environment and detect, gather, and analyze the fundamental driving forces or signals of change (Daft et al., 1988). This allows managers to avoid "tunnel vision" (Stubbart, 1982) and encourages the emergence of disruptive alternative views of the future evolution of the domain under investigation (Cuhls, 2020). The third stage is *forecasting*, in which the consequences of the inputs collected during the preceding stages are anticipated using plausible alternative future scenarios (Hines, 2020; Patvardhan and Ramachandran, 2020). Forecasting considers a range of possibilities or opportunities by navigating the emerging future, determines the likelihood of realizing those possibilities, and suggests ways to best prepare for the future (Kapoor and Wilde, 2022).

The fourth stage, *visioning*, focuses on choosing a preferred future. Visioning helps an organization contemplate its potential futures, available options, and strategic paths, thereby facilitating organizational renewal (Abrahamsen et al., 2023; Cunha et al., 2006; Costanzo, 2004). It covers various scenarios and links them with organizational processes in the form of designs for new products or services, policies, and BMs (McGrath, 2010; Van der Duin and den Hartigh, 2009). The fifth stage is *planning*, in which implications are referred to as (business) opportunities or (strategic) issues. The aim is to organize resources for carrying out the vision and outline a set of strategies and contingency plans for opportunities or issues based on the organization's distinctive

attributes (Bishop and Hines, 2012; Lehr et al., 2017). The sixth and final stage is *acting*, which refers to implementing the plan and concretizing future planning efforts. This stage entails resolving uncertainties, focusing on an alternative future that will eventually prevail, and connecting it to the organization's mission and purpose (Hines, 2020; Fergnani, 2022).

To explain how to study *change* with the help of strategic foresight, Bishop and Hines (2012) and Hines (2020) argued that the first three phases/activities (framing, scanning, and forecasting) are called "mapping the future." They are related to the changes placed on organizations from the external world and describe the most likely futures. The second three phases/activities (visioning, planning, and acting) are called "influencing the future." These are related to changes that organizations seek to effect to realize their preferred future.

2.3. Hypotheses development

2.3.1. The relationship between strategic foresight and BMI

Creating new BMs provides firms with abundant opportunities to embrace new developments. By addressing concerns about input quality and barriers to BMI, solutions can be found by creating a solid and factual foundation through strategic foresight. This means gaining an adequate and accurate understanding of the organization's external environment and actively monitoring and identifying uncertainties and fluctuations that may impact the viability of current and new BMs (Costanzo, 2004). Strategic foresight is relevant in this regard. It provides a structured process that enables a more effective perception of environmental changes and increases awareness of the available opportunities inside and outside the organization by systematically evaluating possible futures. It thus provides organizations with the necessary data to make more informed decisions about resource allocation and the changes needed for BMI (De Smedt, 2013; Meissner and Wulf, 2013; Costanzo, 2004).

Moreover, strategic foresight and, specifically, scenario planning can help overcome three cognitive bounds (Gavetti, 2012; Lehr et al., 2017): 1) *rationality bound* through the systematic identification of change drivers challenging the dominant logic of organizations, 2) *plasticity bound* (resulting from inertia or lack of ability to see or act on emerging opportunities) by engaging in cognitive search not confined to what is possible and known but that renews the mental models and prior beliefs using specific new information (Kapoor and Wilde, 2022), and 3) *shaping ability bound* through participating in and creating a shared future vantage point (when stakeholders are involved and aligned) to have more productive conversations on the specification of the portfolio of desired futures (Von der Gracht et al., 2010; Von der Gracht and Stilings, 2013). In this way, managers can legitimize and conceptualize the environment or course of action, creating novel insights into the future and thus surmounting cognitive barriers (Lehr et al., 2017).

Additionally, considering BMI's structural barriers, embedding strategic foresight into an organization's structure and strategy can foster flexibility, which allows for the generation and justification of new alternative decisions and positive organizational change. Consequently, organizations are better prepared to cope with environmental turbulence (Rudd et al., 2008). Strategic foresight helps overcome structural inertia (Ocasio, 2011) and rapidly alters the structural design of a BM in line with competitive pressures (Rudd et al., 2008) by 1) providing tools that explore and analyze the underlying BM system's structure and dynamics, 2) foreseeing potential changes, and 3) taking necessary actions for transformation through effective communication and sharing information within the organization (Piirainen et al., 2016; Abrahamsen et al., 2023). Based on the above discussion and the notion that the relationship between strategic foresight and BMI awaits testing, we hypothesize the following:

H1. Strategic foresight is positively related to BMI.

In addition to providing input to BMI and establishing a systematic

means to mitigate its barriers to innovation, the existing management literature indicates that strategic foresight can influence BMI indirectly, especially when it comes to cognitive barriers. In other words, the literature connects strategic foresight to mechanisms such as sensemaking and learning¹ that facilitate BMI.

2.3.2. The role of sensemaking in relation to strategic foresight and BMI

Sensemaking is a crucial organizational activity, particularly in dynamic environments in which the creation of a coherent understanding and empowerment of collective actions is essential and challenging (Weick, 1995; Maitlis, 2005). Perceiving environmental uncertainty and confronting ambiguous, novel, and puzzling events, issues, and actions create the need for *sensemaking* within organizations (Weick, 1995; Maitlis and Christianson, 2014). Sensemaking involves organizing the unknown and developing a cognitive map of the environment by extracting and interpreting cues and acting on them (Maitlis, 2005; Sandberg and Tsoukas, 2015; Daft and Weick, 1984). Various dimensions of the sensemaking mechanism have been identified (Alsu-fiani, 2020; Klein et al., 2006; Weick, 1995): 1) *reducing confusion* (by enabling face-to-face debate and clarification), *reducing uncertainty* (by providing more information), and *reducing ambiguity* (by providing different types of information) (Weick, 1995); 2) *gaining comprehension and insight* into which representations (schemas) of relevant information are used to build the cognizance that allows for planning, assessing, and reasoning about alternative courses of action (Pirolli and Card, 2005); 3) *discovering and bridging the* (knowledge) *gap* to move forward; 4) *structuring* by organizing and connecting information (structured knowledge can reduce uncertainty and explain a problem or situation in depth); and 5) *understanding connections* among entities to continuously anticipate trajectories of events and take effective action (Klein et al., 2006).

In dynamic and uncertain environments, mental models must be challenged and renewed (Ehls et al., 2022; Gary et al., 2012). Strategic foresight systematically confronts existing mental models and strives to deconstruct and reconstruct the understanding of uncertainty, thereby enhancing the sensemaking of organizational consequences (Dortland et al., 2014; Gavetti and Menon, 2016; Blackman and Henderson, 2004). Organizations may intentionally or unintentionally filter information that influences their search direction. Thus, how organizations capture signals for and within a sensemaking process is crucial (Day and Schoemaker, 2004). The structured and flexible strategic foresight process reduces complexity by developing mental systems of relationships, guides thinking by going beyond the confines of conventional wisdom, arrives at a deeper understanding of what is essential, and provides meaningful and broader insights and relevant knowledge for understanding future uncertainties and how a future state may evolve (Costanzo, 2004; Tapinos and Pyper, 2018). Overall, strategic foresight shifts perceptual anchors and develops new mental models focused on the future. This enables them to adjust to new situations and respond more quickly and effectively to environmental changes (Wright et al., 2013; Day and Schoemaker, 2004). Foresight can facilitate the sensemaking process by identifying unfamiliar or unforeseen incidents and interpreting and creating meanings for them. Sensemaking increases knowledge about unexpected changes and their potential impact. Having better (shared) knowledge in the form of fact awareness enables organizations to internalize what they see and brings them on board with specific goals. Thus, they can support and execute change effectively and more extensively (Saeed et al., 2023; Ting, 2023; Trabucchi et al., 2022). Accordingly, we hypothesize the following:

H2a. Strategic foresight is positively related to sensemaking.

Besides being a plausible output of strategic foresight, sensemaking

¹ These factors were identified through a systematic literature review. Although we do not report the full review here, detailed information is available from the first author upon request.

can precede BMI and eliminate its excessive ambiguity and complexity (Friesl et al., 2019; Massa and Hacklin, 2020; Gattringer et al., 2021; Moqaddamerad and Tapinos, 2022; Whittle et al., 2023). In fact, sensemaking is required in innovation to understand its nature and develop a novel worldview. Sensemaking enables finding meaning in uncertain and emerging circumstances and is vital in deciding the success and failure of an innovation initiative and developing plausible outcomes in an unfamiliar environment (Bellis et al., 2023). To make sense of new BMs, managers rely on their mental models, which determine what information regarding new BMs will receive attention and how it should be interpreted. This then limits the range of alternative BMs to be used in a particular environment. As the environment changes, mental models must be renewed and new understandings developed to make sense of the relevant new BMs (Barr et al., 1992; Martins et al., 2015). Sensemaking enables organizations to build a collective understanding of the new BM and interpret its various settings and representations, including those of the future. It streamlines decision-making regarding how business should be conducted in an industry by reorganizing resources and capabilities and evaluates unproven BMs in uncertain environments (Neill et al., 2007; George and Bock, 2011; Massa and Hacklin, 2020). Sosna et al. (2010) examined the effectiveness of BMI and found that managerial sensemaking provides the most crucial input. As sensemaking enables organizations to better understand diverse and often conflicting environments, it supports the generation of creative and timely responses through BMI (Neill et al., 2007). Following these earlier (primarily qualitative) studies, we hypothesize the following:

H2b. Sensemaking is positively related to BMI.

The foregoing hypothesis suggests that sensemaking has emerged as an essential factor affecting the analytical and cognitive elements connected to both strategic foresight and BMI. Strategic foresight can influence the cognitive capability to make sense of changes and uncertainties. Sensemaking concretely connects strategic foresight to BMI in practice by facilitating the interpretation of images or cognitive representations of a new BM and organizing an understanding of the underlying design logic of new BMs' value-creating activities (Massa and Tucci, 2021; Doz and Kosonen, 2010; Martins et al., 2015). In addition, in the entrepreneurial context that is usually full of uncertainties due to disrupting the established ways of doing things, sensemaking is very vital for understanding the inherent ambiguity and developing the mental models of how the business works (Whittle et al., 2023). Hence, we hypothesize the following:

H2c. Sensemaking mediates the relationship between strategic foresight and BMI.

2.3.3. The role of learning in relation to strategic foresight and BMI

Another relevant mechanism identified in the literature is *learning*, which refers to acquiring knowledge that enables problem-solving (Catino and Patriotta, 2013; Lloria and Moreno-Luzon, 2014). Learning contributes to an organization's long-term success and competitiveness. It can be categorized into two classes: *exploratory learning*, namely, acquiring external knowledge through search, innovation, experimentation, flexibility, variation, discovery, and play; and *exploitative learning*, namely, applying acquired/existing knowledge to allow refinement, choice, efficiency, selection, production, execution, and implementation (March, 1991; Levinthal and March, 1993; Ali, 2021; Lloria and Moreno-Luzon, 2014; Rojas-Córdova et al., 2022). While exploratory learning expands knowledge scope, exploitative learning strengthens knowledge depth (Li and Yeh, 2015; Mom et al., 2007). In general, both types of learning are essential to innovation (Lichtenthaler, 2008; Jansen et al., 2006; Danneels, 2008). Exploratory learning can be particularly relevant in turbulent and dynamic environments in which coping with future changes and ensuring long-term survival are emphasized while still focusing on innovating to meet the

needs of emerging customers or markets (Levinthal and March, 1993; Mom et al., 2007).

Existing concepts have connected foresight and learning (Bootz et al., 2019), covering its exploration and exploitation aspects, especially related to opportunities beyond an organization's immediate value network (Baskarada et al., 2016; Paliokaitė and Pačesa, 2015). Strategic foresight can trigger and enhance learning (Mortensen et al., 2021; Chermack, 2005; Boe-Lillegraven and Monterde, 2015; Moqaddamerad et al., 2017) when the knowledge gained from the strategic foresight process shakes the dominant logic and pushes the organization to explore. For instance, scanning the environment and changing the business logic creates sound and up-to-date knowledge for explorative learning about alternative futures, market or technological opportunity recognition, and possible organizational responses (Cunha et al., 2006; Paliokaitė and Pačesa, 2015). Strategic foresight advances efficient dialogue and the acquisition, diffusion, and understanding of knowledge (Baskarada et al., 2016). Learning built on strategic foresight enables the design of new routines (Rhisiart et al., 2015). Based on these considerations, we propose the following hypothesis:

H3a. Strategic foresight is positively related to learning.

Learning is also related to BMI. Learning is beneficial for managing unanticipated interactions among mutually dependent BMI activities (Snihur and Eisenhardt, 2022). BMI is a learning-oriented and discovery-driven process (Schneider and Spieth, 2013; George and Bock, 2011). Exploratory learning and approaches such as experimentation and trial-and-error have important implications for BMI, as they create and integrate the required novel knowledge for innovation (McGrath, 2010). However, exploration and exploitation are not mutually exclusive and both types of learning occur during BMI. A new BM is conceptualized through exploration, while exploitation ensures model implementation by requiring the alignment and adjustment of organizational structures, deployment of scarce resources, and mobilization of unique competencies (Sosna et al., 2010; Berends et al., 2016; Mezger, 2014). Based on this, we hypothesize the following:

H3b. Learning is positively related to BMI.

The above discussion infers that learning enables the creative emergence of BMI from strategic foresight. Learning is related to strategic foresight and BMI through the creation and integration of new information and knowledge gained through systematic processes. The foresight process increases the likelihood of structuring, enriching, and expanding new knowledge. Learning leverages the foresight knowledge to be shared within the organization by discussing alternatives or experimenting with new ideas and proposing the best way to innovate BMs (Costanzo, 2004; Yoon et al., 2017). To verify expectations based on earlier theorizing and test the extent to which learning can explain the nature of the relationship between strategic foresight and BMI, we propose the following hypothesis:

H3c. Learning mediates the relationship between strategic foresight and BMI.

2.3.4. The sequential mediating role of sensemaking and learning in relation to strategic foresight and BMI

Altering, constantly updating, and adapting mental models through strategic foresight allows one to stay connected to fast-changing circumstances and see the structure of the future (McMaster, 1996). However, the factors that influence mental model development and renewal can be connected in complex ways. Earlier studies suggest that the way organizations make sense of themselves and their environment structures their learning (Weick, 2005), suggesting that sensemaking precedes learning. Modified or new mental models used in sensemaking provide critical and pertinent inputs and a means of learning (Chermack, 2005). Because sensemaking activities provide meaning to the internal and external information collected by individuals and teams, they

prompt a change in the state of knowledge and, thus, learning (Akgün et al., 2003; Rosa et al., 2021). This enables the systematic exploration of a new BM and flexibly aligns it with the underlying opportunities, needs, and requirements (Mezger, 2014). Therefore, sensemaking as organizing and learning as reorganizing activities could be considered as consecutively related to BMI. Hence:

H4. Sensemaking and learning sequentially mediate the relationship between strategic foresight and BMI.

3. Research methodology

3.1. Data collection and sample

Data were collected using a cross-sectional survey of senior managers. The upper managerial echelons of an organization are presumed to be primarily responsible for the development of BMI, as senior managers set the structure of interconnected BMI activities linked to critical strategic choices (Saebi, 2015). To ensure our respondents were senior managers, we employed screening questions in the questionnaire to identify their managerial roles and engagement in creating new BMs (Kumar et al., 1993).

A draft of the questionnaire was face-validated and pretested with a convenience sample of five experts actively involved in industry and academia with knowledge of and experience in strategic foresight and BMI. Pretesting helped improve the clarity of certain items, after which a pilot study among thirty senior managers was conducted to establish content validity, evaluate the internal consistency of the items, refine the questions, and estimate the duration of the study (Creswell and Creswell, 2018). The pilot participants suggested no specific changes to the clarity or format of the questions.

The data were collected from Finnish organizations, which provide a suitable context for this study, as Finland is ranked among the top ten most innovative economies in the world according to the Global Innovation Index 2020 (Soumitra et al., 2020). To obtain valid, reliable, and high-quality data (Hoskisson et al., 2000), a national statistics institution was consulted, and the population characteristics and data collection objective were shared. For the survey, 578 Finnish organizations were randomly identified from databases containing archival information about the target population.

The identified firms were contacted directly by email, including a cover letter describing the study's purpose; ethical considerations (such as voluntary participation, informed consent, anonymity, confidentiality, and results communication) and a link to an online survey designed using Qualtrics software.² Reminder emails were sent weekly and potential respondents were contacted by phone. The data collection period lasted 2.5 months. A total of 170 responses were received, 109 of which were completed in full and 37 of which were completed acceptably (i.e., fewer than 5 % of missing values for each variable). Hence, these 146 fully and partially completed responses comprised the final sample (response rate: 25.3 %). We replaced the missing values in the 37 partially-completed responses with the mean (Karanja et al., 2013). The 24 partially-completed responses with >5 % of missing values for each variable were excluded from the sample. All 146 respondents were senior managers in various departments, including strategic management, technology and innovation management, R&D, sales, and marketing, with a very high level of engagement in the BMI activities within their organizations.

Organizational characteristics, including firm age, firm size, industry, and international reach, were included as variables that may influence BMI (Bouncken and Fredrich, 2016; Bucherer et al., 2012; Hacklin et al., 2018; OCSE, 2005; Waldner et al., 2015). As shown in Table 1, 63.7 % of the sampled organizations were large enterprises

Table 1
Demographic profile of the respondent organizations.

Characteristics	Classifications	Percentage	Frequency
Industry type	ICT	34.9 %	51
	Manufacturing	33.6 %	49
	Engineering and R&D	22.6 %	33
	Consumer services	8.9 %	13
	50–99	19.2 %	28
Firm size (No. of full-time employees)	100–249	17.1 %	25
	250–499	25.3 %	37
	500–999	10.3 %	15
	1000–1499	10.3 %	15
	1500–2999	9.6 %	14
	>3000	8.2 %	12
	0–1	6.8 %	10
Firm age (year)	2–5	15.1 %	22
	6–10	15.8 %	23
	11–20	22.6 %	33
	21–50	21.9 %	32
	>50	17.8 %	26
Firm geographical location of operation	Regional	21.9 %	32
	National	38.4 %	56
	Global	39.7 %	58

(defined as having 250 or more employees) and 36.3 % were SMEs (50–249 employees). In total, 37.7 % of the organizations were 10 years old or younger and 62.3 % were >10 years old. The organizations belonged to various industries, including information and communication technology (ICT) (34.9 %), manufacturing (33.6 %), engineering and R&D (22.6 %), and consumer services (8.9 %). Finally, 21.9 % of the firms were operating regionally, 38.4 % nationally, and 39.7 % globally.

3.2. Common method bias assessment

To minimize common method bias, this study followed the procedural precautions of Podsakoff et al. (2003). First, in the questionnaire development stage, we pretested the questionnaire to examine the items and survey design to minimize respondents' efforts in answering the survey. Moreover, the independent and dependent variables were placed at some distance in the questionnaire; the items were randomized and did not imply any preferred responses. Thus, any wording or sequence of variables that might have caused a priming effect was avoided. Second, Harman's single-factor test was conducted. The test showed no immediate problems because a single factor explained 36.19 % of the sample's variance, which was well below the 50 % threshold. Hence, common method bias was not a cause for concern (Volberda et al., 2012). In addition, the bivariate correlations between the constructs were tested and showed relatively low correlations ($r > 0.90$) (Lowry and Gaskin, 2014). Finally, we evaluated the vertical and lateral collinearity among the constructs by assessing the variance inflation factors (VIFs) (Kock, 2015). To examine common method bias in structural equation modeling studies, Kock (2015, p. 7) suggested that "[i]f all VIFs resulting from a full collinearity test are equal to or lower than 3.30, the model can be considered free of common method bias." As the highest VIF from the full collinearity test was below 3.30 (Table 2), common method bias was not an issue in this study's sample. Additionally, non-response bias was tested by grouping respondents into early and late and examining any differences in their demographic characteristics and key study variables (Armstrong and Overton, 1977). The test revealed no significant differences between the early and later respondents. Hence, non-response bias was also not a concern in this study.

² <https://www.qualtrics.com/>.

Table 2
Mean, standard deviations, correlations and discriminant validity results.

Construct	Mean	SD	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Framing	3.83	0.89	1.82	<i>1.00</i>	0.24	0.41	0.33	0.32	0.67	0.21	0.09	0.36	0.17	0.24	0.51	0.26	0.27	0.19	0.39	0.13	0.00	0.06	0.07
2. Scanning	3.76	0.84	1.89	0.24**	<i>1.00</i>	0.72	0.53	0.40	0.55	0.16	0.24	0.47	0.19	0.23	0.25	0.39	0.36	0.32	0.17	0.12	0.04	0.09	0.09
3. Forecasting	4.05	0.52	2.07	0.33**	0.56**	<i>0.74</i>	0.70	0.60	0.80	0.38	0.41	0.49	0.47	0.41	0.34	0.71	0.40	0.52	0.25	0.25	0.22	0.13	0.14
4. Visioning	4.03	0.62	2.68	0.26**	0.43**	0.42**	<i>0.86</i>	0.74	0.48	0.22	0.49	0.59	0.38	0.23	0.18	0.57	0.55	0.48	0.40	0.13	0.07	0.06	0.03
5. Planning	3.96	0.62	2.15	0.32**	0.40**	0.46**	0.60**	<i>1.00</i>	0.54	0.13	0.25	0.28	0.22	0.25	0.19	0.33	0.34	0.37	0.24	0.08	0.06	0.03	0.04
6. Acting	3.43	0.75	2.01	0.56**	0.46**	0.64**	0.33**	0.44**	<i>0.78</i>	0.33	0.40	0.58	0.40	0.40	0.61	0.59	0.37	0.34	0.26	0.06	0.09	0.11	0.09
7. Dimension 1	3.38	0.75	2.61	0.19*	0.15	0.30**	0.15	0.06	0.27**	<i>0.86</i>	0.53	0.60	0.69	0.53	0.71	0.58	0.23	0.14	0.34	0.10	0.09	0.22	0.25
8. Dimension 2	3.51	0.73	1.98	0.09	0.23**	0.31**	0.37**	0.23**	0.31**	0.43**	<i>0.84</i>	0.84	0.82	0.59	0.32	0.79	0.43	0.34	0.18	0.15	0.10	0.09	0.11
9. Dimension 3	3.45	0.66	2.64	0.31**	0.41**	0.36**	0.41**	0.23**	0.44**	0.48**	0.69**	<i>0.77</i>	0.80	0.61	0.67	0.73	0.49	0.36	0.27	0.17	0.14	0.07	0.07
10. Dimension 4	3.50	0.68	3.74	0.15	0.17*	0.35**	0.27**	0.19*	0.31**	0.54**	0.63**	0.71**	<i>0.83</i>	0.72	0.62	0.80	0.38	0.22	0.14	0.11	0.12	0.04	0.09
11. Dimension 5	3.52	0.85	3.24	0.24**	0.22**	0.34**	0.19*	0.25**	0.34**	0.48**	0.53**	0.54**	0.63**	<i>1.00</i>	0.34	0.54	0.29	0.21	0.26	0.03	0.01	0.16	0.08
12. Exploration	3.35	0.70	2.09	0.36**	0.16	0.19*	0.11	0.12	0.38**	0.37**	0.17*	0.41**	0.37**	0.21*	<i>0.74</i>	0.40	0.33	0.36	0.14	0.25	0.06	0.30	0.19
13. Exploitation	3.37	0.72	1.60	0.21*	0.31**	0.45**	0.37**	0.27**	0.38**	0.38**	0.55**	0.50**	0.52**	0.41**	0.18*	<i>0.79</i>	0.68	0.56	0.24	0.30	0.07	0.21	0.13
14. Value creation	3.45	0.79	2.22	0.26**	0.32**	0.29**	0.42**	0.32**	0.28**	0.15	0.38**	0.40**	0.31**	0.28**	0.19*	0.54**	<i>0.71</i>	0.89	0.29	0.19	0.13	0.25	0.10
15. Value proposition	3.64	0.76	3.23	0.16	0.31**	0.38**	0.38**	0.35**	0.26**	0.02	0.29**	0.30**	0.18*	0.19*	0.05	0.45**	0.77**	<i>0.71</i>	0.34	0.24	0.19	0.37	0.07
16. Value capture	3.49	0.84	3.29	0.35**	0.15	0.15	0.28**	0.21*	0.19*	0.29**	0.15	0.20*	0.10	0.24**	0.08	0.13	0.21*	0.22**	<i>0.79</i>	0.21	0.24	0.29	0.16
17. Age	4.44	1.30	1.64	0.13	−0.12	−0.14	0.02	0.08	0.05	−0.09	−0.14	−0.07	−0.05	−0.03	0.10	−0.26**	−0.16	−0.22**	0.19*	<i>1.00</i>	0.26	0.38	0.02
18. Size	3.81	2.98	1.53	0.00	0.03	0.06	0.06	−0.06	0.07	−0.08	0.08	0.12	0.10	0.01	−0.02	0.03	0.12	0.17*	−0.21**	−0.26**	<i>1.00</i>	0.31	0.09
19. Industry	3.01	1.78	1.27	−0.06	−0.09	0.06	0.00	0.03	−0.02	−0.20*	−0.06	−0.01	−0.01	−0.16*	−0.08	0.07	0.24**	0.35**	−0.29**	−0.38**	0.30**	<i>1.00</i>	0.04
20. Location	2.99	0.98	1.17	0.07	−0.09	0.05	0.03	−0.04	−0.05	0.22**	0.01	−0.02	0.07	0.08	0.14	0.08	−0.01	−0.04	0.15	0.02	−0.09	−0.03	<i>1.00</i>

Note: Dimension 1 = reducing confusion, uncertainty; Dimension 2 = gaining comprehension and insight; Dimension 3 = gap discovering and bridging; Dimension 4 = structuring; Dimension 5 = understanding connections; significance levels: $p < 0.05^*$; $p < 0.01^{**}$; SD = standard deviation.

Diagonal and italicized elements are the square roots of the AVE (average variance extracted).

The elements appeared in the lower-left half are the correlations between the constructs values.

The elements appeared in the upper-right half are the HTMT values.

3.3. Measurement of the constructs

All the measures used in this study were adapted from previously validated scales, except the strategic foresight measure. The procedure for developing the strategic foresight measure was based on a broad yet detailed systematic approach that captures strategic foresight as an analytical process, aligning well with our theoretical view. Specifically, the inclusive framework foresight method (Hines and Bishop, 2013; Hines, 2020) can be used to conduct strategic foresight activities, starting with scanning and ending with the acting phase.³ We applied this method to address each process component's key activities and major goals that reflect the organization's future orientation. To develop the strategic foresight instrument, standard scale development procedures were applied based on established procedures (Churchill Jr, 1979), beginning with the specification of the content domains.

Based on a comprehensive literature review of qualitative studies (e.g., Slaughter, 1997; Horton, 1999; Voros, 2003; Bezold, 2009; Grim, 2009; Bishop and Hines, 2012; Hines and Bishop, 2013; Gavetti and Menon, 2016), the strategic foresight construct was defined and a pool of potential items that cover the process and activities of strategic foresight in organizations was generated. Special attention was paid to the instrumentation's content validity. Thus, the primary pool was pretested and revised based on feedback from field experts. Applying the framework foresight method (Hines and Bishop, 2013; Hines, 2020) and methodological guidelines presented by Henseler (2017) and Sarstedt et al. (2019), the resulting 12-item strategic foresight scale was operationalized as a reflective-formative higher-order construct. This construct consisted of six first-order constructs: "framing" (one-item scale), "scanning" (one-item scale), "forecasting" (three-item scale), "visioning" (two-item scale), "planning" (two-item scale), and "acting" (three-item scale) dimensions (Table 3).

For the strategic foresight construct, all items were measured using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree"). The mean (3.86), standard deviation (0.62), and Cronbach's alpha (0.82) confirmed the reliability of the scale. Thus, the validity and reliability analyses indicated that the strategic foresight scale was appropriately constructed (Yi and Gong, 2013). In addition, concerning unidimensionality, an exploratory factor analysis of strategic foresight extracted a single factor that explained 39.39 % of the variance, confirming the convergent and discriminant validity of the scale.

The measurement items for the remaining constructs were drawn from established scales that have previously been tested and considered to be reliable. The *sensemaking* scale was taken from Alsufiani (2020). As shown in Table 4, it was modeled as a reflective-reflective higher-order construct that consisted of five first-order dimensions: "reducing confusion, uncertainty, and ambiguity" (three-item scale), "gaining comprehension and insight" (three-item scale), "gap discovering and bridging" (four-item scale), "structuring" (three-item scale), and "understanding connections" (one-item scale) (Henseler, 2017; Sarstedt et al., 2019). All the items were measured using a five-point Likert scale (1 = "not at all," 5 = "to a great extent").

The *learning* scale was adopted and modified from Lloria and Moreno-Luzon (2014). As shown in Table 5, this scale was operationalized as a reflective-reflective higher-order construct comprising two dimensions: "exploration" (three-item scale) and "exploitation" (two-item scale) (Henseler, 2017; Sarstedt et al., 2019). The respondents were asked to rate their opinions on items using a five-point Likert scale (1 =

"strongly disagree," 5 = "strongly agree"). The instruments for sensemaking and learning were chosen to reflect activities that matched our theoretical approach.

The *BMI* scale adapted from Clauss (2016) was modeled as a reflective-formative higher-order construct consisting of three first-order dimensions: "value creation" (eight-item scale), "value proposition" (eight-item scale), and "value capture" (five-item scale) (Henseler, 2017; Sarstedt et al., 2019), as shown in Table 6. This measure denoted the BMI activities of the respondents' organizations. The three first-order dimensions proved reliable and valid. All the items were measured using a five-point Likert scale (1 = "strongly disagree," 5 = "strongly agree").

Moreover, this study included several control variables because of their potential effects on BMI (Bouncken and Fredrich, 2016). Firm size was measured on a nominal seven-point scale. Larger organizations are believed to have sufficient resources and capabilities to initiate and implement BMI (Damanpour, 1991). Firm age was measured on a nominal six-point scale. Older organizations are more experienced and competent in innovation operations. They have more advantages in capturing and leveraging BMI than younger organizations that are new to the market. Such newer organizations require a high setup time for external business connections and may have immature organizational routines, which can be an obstacle to BMI (Brüderl and Schüssler, 1990; Jiménez-Jiménez and Sanz-Valle, 2011). The organizations' industry was also considered. Industry-related factors such as technological innovation impact BMs and managers should proactively renew existing BMs to better fit the new value landscape (Hacklin et al., 2018). Finally, the location of each organization's operations was measured on an ordinal three-point scale (i.e., regional, national, and global). Innovative organizations benefit from access to international sources and can develop new BMs that fit both their distinct capabilities and the dynamic markets in which they operate (Tallman et al., 2018).

3.4. Statistical procedure

We applied a variance-based structural equation modeling technique known as partial least squares path modeling (PLS-PM) to estimate the measurement model and test our hypotheses. This technique maximizes the explained variance of endogenous latent variables and is suitable for exploratory and predictive studies (Hair Jr et al., 2021). PLS-PM has been widely applied in similar social science disciplines, including organizational innovation and strategic management (Hair et al., 2012; Ali, 2021). We used PLS-PM because of its flexibility and potential for use with complex models that have multiple constructs, indicators, variables, and structural paths (Hair et al., 2019; Hair Jr et al., 2021; Lowry and Gaskin, 2014). PLS-PM can also be applied to hierarchical models with formative constructs or a combination of formative and reflective constructs (Wetzels et al., 2009; Hair et al., 2012), as in this study. Moreover, the method is appropriate for this study because it deals with a complex model and a small sample size ($n = 146$) (Willaby et al., 2015; Cassel et al., 1999). In addition, PLS-PM is suitable when the research objective is to better understand complexity "by exploring theoretical extensions of established theories" (Hair et al., 2019, p. 5). It has high statistical power and is useful in exploratory research (Hair et al., 2019; Hair Jr et al., 2021). In addition, PLS-PM permits the simultaneous estimation of multiple relationships between one or more independent variables (e.g., strategic foresight) and one or more dependent variables (e.g., learning, sensemaking, and BMI) (Hair et al., 2011).

4. Results

The hypotheses were tested using the SmartPLS4 software package⁴.

³ Other existing process frameworks are more generic and lack the systematic activity process design that we required; see, for example, the frameworks proposed by Horton (1999), Voros (2003), Bezold (2009), and Grim (2009). While other scales (e.g., Amstéus, 2011; Paliokaité and Pačėsa, 2015; Jissink et al., 2018) also exist, we chose not to rely on them, as they lack the process view. Therefore, we decided to create a new scale that fits the purpose of our study.

⁴ <https://www.smartpls.com/>.

Table 3
Measurement model assessment of strategic foresight.

Mode A	Code	Item wording	SL	SE	t-value	α	CR	ρ_A	AVE	VIF
A) Framing	FRM1	In our firm, we engage in ...	0.14	0.14	1.01	1.00	1.00	1.00	1.00	1.48
		Identifying the problems and the costs of solutions	1.00	0.00	0.00					
			0.10	0.13	0.61	1.00	1.00	1.00	1.00	1.60
B) Scanning	SCN1	Identifying key drivers of change that influence our firm	1.00	0.00	0.00					
			0.32	0.15	2.20	0.70	0.71	0.79	0.55	2.11
C) Forecasting	FRC1	Discovering new opportunities	0.76	0.06	13.40					
	FRC2	Prioritization of the future opportunities	0.66	0.01	6.86					
	FRC3	Identifying uncertainties and/or scenarios	0.80	0.05	14.87					
D) Visioning	VIS1	Deciding on the firm's preferred future	0.51	0.14	3.70	0.70	0.70	0.85	0.74	1.70
			0.89	0.03	33.25					
		Determining if working toward the preferred future	0.83	0.04	20.75					
E) Planning	VIS2		0.11	0.15	0.74	1.00	1.00	1.00	1.00	1.77
			0.35	0.17	2.05	0.70	0.71	0.83	0.61	2.29
F) Acting	PLN1	Making choices for the firm's strategic direction	1.00	0.00	0.00					
	ACT1	Communicating the alternative future strategies throughout the whole firm	0.73	0.07	10.74					
	ACT2	Managing uncertainties	0.79	0.05	17.53					
	ACT3	Monitoring the emerging future and adjusting as needed	0.81	0.04	22.06					

Note: SL = standard loadings; SE = standard error; α = Cronbach's alpha; CR = composite reliability; ρ_A = Dijkstra-Henseler's rho; AVE = average variance extracted; VIF = variance inflation factor.

Table 4
Measurement model assessment of sensemaking.

Mode A	Code	Item wording	SL	SE	t-Value	α	CR	ρ_A	AVE
A) Dimension 1		In our firm we aim to ...	0.17	0.05	15.24	0.82	0.84	0.89	0.73
	RED1	Reduce confusion (i.e., chaos and unclearness)	0.89	0.03	29.49				
	RED2	Reduce uncertainty	0.84	0.09	9.14				
	RED3	Reduce ambiguity (i.e., more than one interpretation)	0.83	0.04	19.60				
			0.83	0.03	25.61	0.80	0.82	0.88	0.71
B) Dimension 2	COM1	Gain insight from the available information	0.79	0.05	15.42				
	COM2	Construct an understanding from the available information	0.83	0.04	22.06				
	COM3	Comprehending a new plan of action	0.90	0.02	40.00				
			0.88	0.03	31.66	0.76	0.78	0.85	0.59
			0.70	0.06	11.35				
C) Dimension 3	GAP1	Monitor the environment and collect data	0.65	0.08	8.74				
	GAP2	Step-by-step perform the action plan toward the future	0.87	0.03	27.64				
	GAP3	Discover where the gaps are in how we understand a situation	0.82	0.04	19.05				
	GAP4	Bridge gaps in our understanding of a situation	0.88	0.03	35.31	0.77	0.77	0.87	0.68
			0.83	0.05	15.62				
D) Dimension 4	STR1	Find a structure in the information	0.78	0.09	9.21				
	STR2	Find a way to organize the information	0.87	0.04	24.22				
	STR3	Develop a coherent representation of the information among us	0.72	0.05	14.85	1.00	1.00	1.00	1.00
			0.72	0.05	14.85				
E) Dimension 5	UND1	Understand connections between events	1.00	0.00	0.00				

Note: Dimension 1 = reducing confusion, uncertainty; Dimension 2 = gaining comprehension and insight; Dimension 3 = gap discovering and bridging; Dimension 4 = structuring; Dimension 5 = understanding connections; SL = standard loadings; SE = standard error; α = Cronbach's alpha; CR = composite reliability; ρ_A = Dijkstra-Henseler's rho; AVE = average variance extracted.

Table 5
Measurement model assessment of learning.

Mode A	Code	Item wording	SL	SE	t-Value	α	CR	ρ_A	AVE
A) Exploration		In our firm ...	0.91	0.03	26.51	0.71	0.72	0.78	0.55
	EXPOR1	We try to understand the way our colleagues think	0.67	0.09	7.89				
	EXPOR2	We learn from anticipating the future	0.77	0.06	12.83				
	EXPOR3	We can break away from traditional perceptions and see things in a new, different light	0.79	0.06	14.41				
			0.55	0.16	3.53	0.70	0.74	0.75	0.62
B) Exploitation	EXPOI1	The firm's procedures and processes are laid down in a manual, booklet or similar	0.58	0.26	2.26				
	EXPOI2	We have databases which allow experiences and knowledge to be stored and used later	0.95	0.16	6.06				

Note: SL = standard loadings; SE = standard error; α = Cronbach's alpha; CR = composite reliability; ρ_A = Dijkstra-Henseler's rho; AVE = average variance extracted.

The validity of PLS-PM requires both evaluating the measurement model and testing the structural model (Hair Jr et al., 2021). We mobilized the bootstrap procedure using 5000 resamples to test the significance of the structural paths. The following section presents the results of the measurement and structural models.

4.1. Measurement model

The measurement model of all the first-order constructs was constructed by testing its reliability, convergent validity, and discriminant validity. Reliability was verified at the item and construct levels. Tables 3–6 show that the coefficients of Cronbach's alpha (α), Dijkstra-Henseler's rho (ρ_A), and composite reliability were equal to or >0.70,

Table 6
Measurement model assessment of business model innovation (BMI).

Mode A	Code	Item wording	SL	SE	t-Value	α	CR	ρ_A	AVE	VIF
A) Value creation		In our firm we ...	0.46	0.02	29.62	0.86	0.87	0.89	0.50	2.85
	VCRE1	have collaboration with new partners that regularly help us to further develop our business model	0.69	0.06	10.99					
	VCRE2	Were recently / constantly able to significantly improve our internal processes	0.67	0.06	11.95					
	VCRE3	Utilize innovative procedures and processes during the manufacturing of our products	0.75	0.05	14.73					
	VCRE4	have employees whose knowledge is very up-to-date compared to our direct competitors' employees	0.70	0.05	15.03					
	VCRE5	Have technical equipment (necessary items) that is very innovative relative to our competitors	0.65	0.08	8.77					
	VCRE6	Regularly utilize new technical opportunities to extend our product and service portfolio	0.65	0.09	7.60					
	VCRE7	Are constantly searching for new collaboration partners	0.75	0.06	12.69					
	VCRE8	Regularly utilize opportunities that arise from integration of new partners into our processes	0.78	0.05	16.06					
			0.50	0.02	29.09	0.86	0.88	0.89	0.51	2.88
	VPRO1	Regularly address new, unmet customer needs	0.73	0.05	15.45					
	VPRO2	Try to increase customer retention by new service offerings	0.63	0.09	6.69					
	VPRO3	Emphasize innovative/modern actions to increase customer retention.	0.67	0.07	9.42					
	VPRO4	Create products or services that are very innovative in relation to our competitors	0.79	0.03	23.15					
	VPRO5	Solve customer needs by our products or services regularly that were not solved by competitors	0.77	0.04	20.13					
	VPRO6	Regularly take opportunities that arise in new or growing markets	0.77	0.04	20.13					
B) Value proposition	VPRO7	Regularly address new, unserved market segments	0.77	0.05	16.14					
	VPRO8	Are constantly seeking new customer segments and markets for our products and services	0.60	0.07	8.08					
			0.27	0.02	18.61	0.80	0.84	0.87	0.63	1.43
	VCAP1	Regularly reflect on our price-quantity strategy	0.67	0.07	9.45					
	VCAP2	Actively seek opportunities to save manufacturing costs	0.84	0.04	22.18					
	VCAP3	Constantly examine the production costs and if necessary, amended according to market prices	0.87	0.03	34.78					
	VCAP4	Regularly utilize opportunities that arise through price differentiation	0.77	0.05	14.14					

Note: SL = standard loadings; SE = standard error; α = Cronbach's Alpha; CR = composite reliability; ρ_A = Dijkstra-Henseler's rho; AVE = average variance extracted; VIF = variance inflation factor.

indicating good construct reliability (Nunnally, 1978). The reliability of the indicators was assessed by examining whether the construct loadings of the items were acceptable. The loadings of most items were >0.70 . We removed those with a low contribution and retained those close to the 0.70 threshold. Specifically, from the strategic foresight construct, we removed the item "PLN2" from the "planning" scale, while from the BMI construct, we removed the item "VCAP5" from the "value capture" scale. Convergent validity was assessed by checking if the average variance extracted value was above the recommended threshold of 0.50 (Fornell and Larcker, 1981). The values of all the constructs ranged from 0.53 to 0.62 (Tables 3–6). Consequently, all the constructs had acceptable convergent validity (Hair Jr et al., 2021).

To assess discriminant validity, we used the Fornell–Larcker criterion (Fornell and Larcker, 1981; Kock, 2014) and heterotrait-monotrait (HTMT) ratio of correlations criterion (Henseler et al., 2015). First, we examined whether the square root of each construct's average variance extracted value was greater than its highest correlation with any other construct (Table 2). Second, for all the first-order reflective constructs, none of the HTMT values were higher than 0.90, confirming the HTMT criterion (Henseler et al., 2015) (Table 2). These results showed that all items were good indicators of their respective latent variables (Hair Jr et al., 2021).

Finally, all the constructs were operationalized as higher-order constructs, including first- and second-order reflective and formative constructs. Following previous studies (Hair Jr et al., 2021; Henseler, 2017; Sarstedt et al., 2019), sensemaking and learning were operationalized as Type I reflective-reflective second-order constructs, while strategic foresight and BMI were operationalized as Type II reflective-formative second-order constructs. The higher-order constructs were

evaluated using a two-stage approach. In the first stage, the latent variable scores of all the first-order reflective constructs were obtained. In the second stage, the latent variable scores served as manifest variables to form the second-order constructs (Becker et al., 2012; Hair Jr et al., 2021). The validity and reliability of sensemaking and learning were assessed using general criteria for evaluating measurement models, including reliability, convergent validity, and discriminant validity. Table 4 shows the regression weights of all five first-order constructs on the second-order construct of sensemaking, which had positive weights (0.17 for Dimension 1, 0.83 for Dimension 2, 0.88 for Dimension 3, 0.88 for Dimension 4, and 0.72 for Dimension 5). Similarly, the regression weights of the first-order composites of exploration (0.91) and exploitation (0.55) had positive weights on the second-order composite of learning, as shown in Table 5.

The validity and reliability of strategic foresight and BMI were assessed by examining the multicollinearity among the formative constructs, correlational weights (i.e., the extent to which each dimension contributes to the respective higher-order construct), signs, and magnitudes (Hair Jr et al., 2021). Multicollinearity among the first-order formative constructs was assessed by examining the variance inflation factors, which were below 3.30 (Diamantopoulos and Winklhofer, 2001) (Table 3). Hence, low multicollinearity was observed (Hair Jr et al., 2021). In addition, the weights of strategic foresight were significant (0.14 for "framing," 0.10 for "scanning," 0.32 for "forecasting," 0.51 for "visioning," 0.11 for "planning," and 0.35 for "acting") (Table 3), consistent with the theoretical background. Finally, the correlational weights of BMI (0.46 for "value creation," 0.50 for "value proposition," and 0.27 for "value capture") were significant and the collinearity among the three first-order constructs was minimal (<3.30) (Table 6).

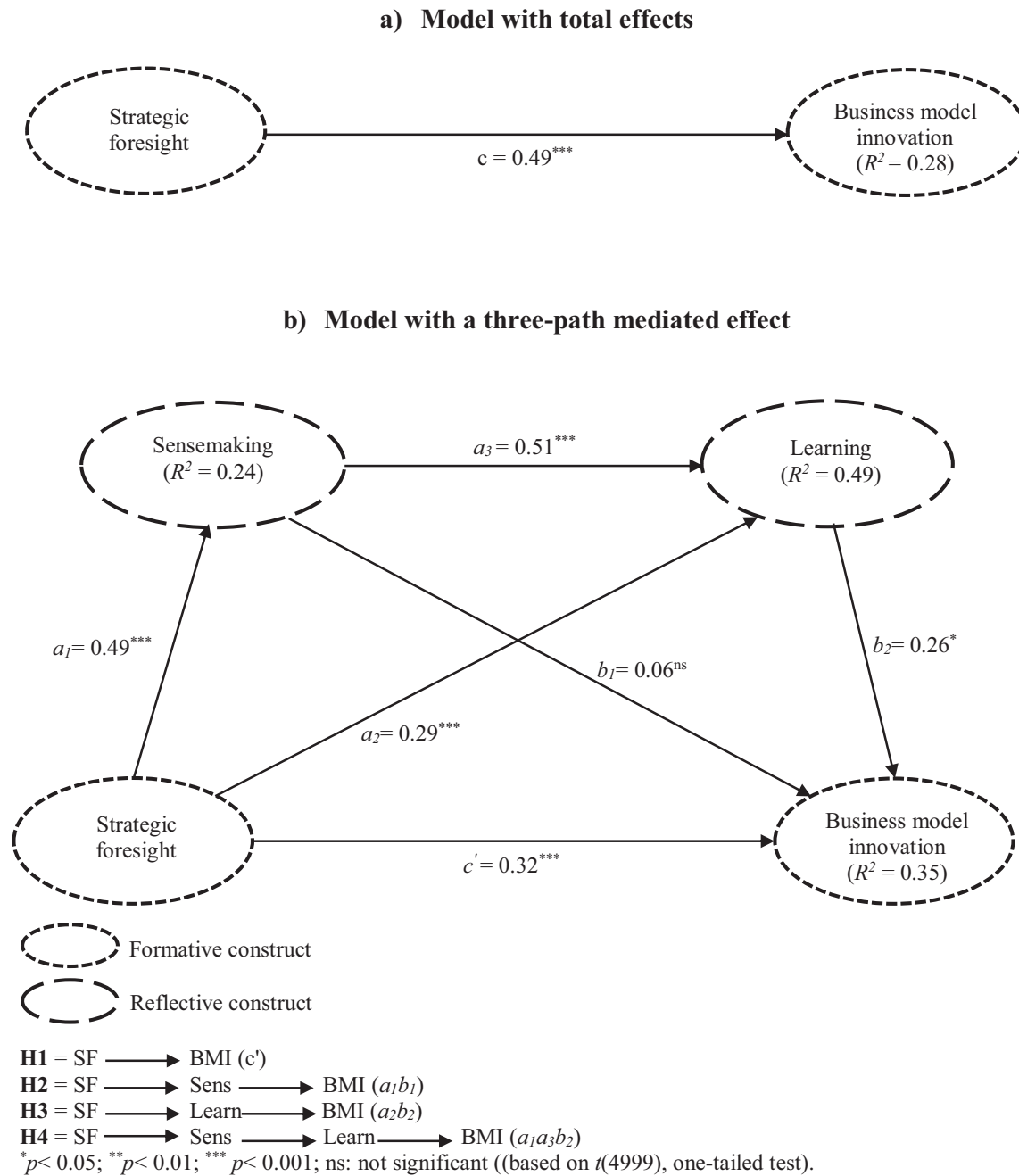


Fig. 1. Structural model.

4.2. Structural model

The structural model in Fig. 1 shows the explained variance of the endogenous variables (R^2), which indicates the model's in-sample explanatory power and standardized paths (β). To evaluate the structural model, we used Q^2 values (Geisser, 1974; Stone, 1974), "which combine aspects of out-of-sample prediction and in-sample explanatory power" (Hair et al., 2019, p. 12), and the effect sizes of the path coefficients, in contrast to modeling approaches that rely on goodness-of-fit measures (Whittaker and Schumacker, 2022). The R^2 values for sensemaking, learning, and BMI showed that the structural model explained 24 %, 49 %, and 35 % of the variance in the construct, respectively. This suggested that the structural model had satisfactory in-sample predictive power. The R^2 values were further confirmed by the Q^2 values of the fit of the structural model obtained using the

blindfolding technique (Hair Jr et al., 2021). The Q^2 values for sensemaking (0.23), learning (0.28), and BMI (0.23) were all above zero, again suggesting satisfactory in-sample predictive power.

To test the structural model, we used a bootstrapping procedure. This method computes the bootstrap standard error and generates approximate t -values to test the significance of the structural path (Wong, 2013). To assess the statistical significance of the path coefficients (t -statistics) and standard errors (Henseler et al., 2009), we performed a bootstrap analysis with 5000 resamples and calculated the bootstrapping confidence intervals of the standardized regression coefficients in the analysis. As shown in Fig. 1, all the direct effects were significant except for b_1 (sensemaking on BMI). Table 7(C) shows that the percentile bootstraps at the 95 % confidence interval and bias-corrected confidence intervals confirmed this result.

The results demonstrated that strategic foresight had a positive effect

Table 7

Structural model results (summary of direct relationship tests and mediating effect tests).

Structural path	Path coefficient	t-Value (bootstrap)	p-Values	Significant difference ($p < 0.05$)?	95 % confidence interval bias corrected
<i>A) Summary of direct relationship tests</i>					
Strategic foresight $\rightarrow$ BMI (c')	0.32***	4.06	0.00	Yes	[0.17, 0.48]
H2a = Strategic foresight $\rightarrow$ Sensemaking (a_1)	0.49***	7.01	0.00	Yes	[0.34, 0.62]
H2b = Sensemaking $\rightarrow$ BMI (b_1)	0.06 ^{ns}	0.55	0.29	No	[-0.17, 0.29]
H3a = Strategic foresight $\rightarrow$ learning (a_2)	0.29***	4.39	0.00	Yes	[0.16, 0.41]
Sensemaking $\rightarrow$ learning (a_3)	0.51***	9.06	0.00	Yes	[0.40, 0.63]
H3b = Learning $\rightarrow$ BMI (b_2)	0.26*	2.31	0.01	Yes	[0.03, 0.48]
<i>B) Control variables</i>					
Firm age $\rightarrow$ BMI	0.00 ^{ns}	0.03	0.49	No	[-0.16, 0.16]
Firm size $\rightarrow$ BMI	-0.02 ^{ns}	0.23	0.41	No	[-0.16, 0.13]
Firm industry $\rightarrow$ BMI	0.21*	2.73	0.00	Yes	[0.06, 0.36]
Firm location $\rightarrow$ BMI	-0.02 ^{ns}	0.35	0.36	No	[-0.15, 0.11]
Structural path	Path coefficient	t-Value (bootstrap)	Significant difference ($p < 0.05$)?	Percentile 95 % confidence interval	Percentile 95 % confidence interval bias corrected
<i>C) Summary of direct relationship tests and mediating effect tests</i>					
Total effect of strategic foresight on BMI (c)	0.49***	8.35	Yes	[0.37, 0.61]	[0.37, 0.61]
H1 = Direct effect of strategic foresight on BMI (c')	0.32***	4.31	Yes	[0.16, 0.47]	[0.17, 0.48]
Indirect effects (mediating effect) of strategic foresight on BMI					
H2c = a_1b_1	0.03 ^{ns}	0.06	No	[-0.06, 0.14]	[-0.06, 0.14]
H3c = a_2b_2	0.08*	1.85	Yes	[0.02, 0.15]	[0.02, 0.15]
H4 = $a_1a_3b_2$	0.07*	2.30	Yes	[0.02, 0.11]	[0.03, 0.12]
$R^2_{\text{(Sensemaking)}} = 0.24$; $Q^2_{\text{(Sensemaking)}} = 0.23$ $R^2_{\text{(Learning)}} = 0.49$; $Q^2_{\text{(Learning)}} = 0.28$ $R^2_{\text{(BMI)}} = 0.35$; $Q^2_{\text{(BMI)}} = 0.23$ H1: Strategic foresight $\rightarrow$ Business model innovation = c' H2: Strategic foresight $\rightarrow$ Sensemaking $\rightarrow$ Business model innovation = a_1b_1 H3: Strategic foresight $\rightarrow$ Learning $\rightarrow$ Business model innovation = a_2b_2 H4: Strategic foresight $\rightarrow$ Sensemaking $\rightarrow$ Learning $\rightarrow$ Business model innovation = $a_1a_3b_2$					

Note: * $|t| \geq 1.96$ at p 0.05 level; ** $|t| \geq 2.58$ at p 0.01 level; *** $|t| \geq 3.29$ at p 0.001 level; Sig. = significance; ns = not significant (based on $t(4999)$, one-tailed test). R^2 = determination coefficients; Q^2 = predictive relevance of endogenous (omission distance = 7).

Threshold for R^2 value ≥ 0.25 (weak); ≥ 0.50 (moderate); ≥ 0.75 (substantial).

Threshold for Q^2 value > 0 indicate predictive relevance.

on BMI ($c' = \beta = 0.32^{***}$, $t = 4.31$, $p < 0.001$, BCa - CI_{95%} [0.17, 0.48]), confirming H1. In addition, the effect of strategic foresight on sensemaking was positive ($a_1 = \beta = 0.49^{***}$, $t = 8.35$, $p < 0.001$, BCa - CI_{95%} [0.37, 0.61]). By contrast, the effect of sensemaking on BMI was not significant ($b_1 = \beta = 0.06^{ns}$, $t = 0.55$, $p > 0.05$, BCa - CI_{95%} [-0.17, 0.29]); however, we did find a correlation between sensemaking and BMI, as shown in Table 7(A). Therefore, H2a was supported, whereas H2b was not. Furthermore, strategic foresight had a positive effect on learning ($a_2 = \beta = 0.29^{***}$, $t = 4.39$, $p < 0.001$, BCa - CI_{95%} [0.16, 0.41]) and the effect of learning on BMI was also significant ($b_2 = \beta = 0.26^*$, $t = 2.31$, $p < 0.05$, BCa - CI_{95%} [0.03, 0.48]), as shown in Table 7(A). Therefore, H3a and H3b were also supported.

This study followed the guidelines provided by Hayes (2022) to run the mediation analyses used to test H2c, H3c, and H4. Fig. 1(a) shows the total effect (c) of strategic foresight on BMI. Fig. 1(b) shows the total effect of strategic foresight on BMI as the sum of the direct (c') and indirect effects ($a_1b_1 + a_2b_2 + a_2a_3b_2$). The indirect effects were estimated by using the product of the path coefficients for each path in the mediation chain. The empirical results provided evidence that the total effect of strategic foresight on BMI was positive and significant ($c = \beta = 0.49^{***}$, $t = 7.01$, $p < 0.001$, BCa - CI_{95%} [0.34, 0.62]).

When the two mediators (sensemaking and learning) were introduced into the structural model, strategic foresight decreased its effect but maintained a positive and significant direct effect on BMI (H1; $c' = \beta = 0.32^{***}$, $t = 4.31$). Therefore, this result supported H1. Next, the indirect effect of strategic foresight on BMI via sensemaking was not significant ($a_1b_1 = \beta = 0.03$, $t = 0.06$, $p > 0.05$, BCa - CI_{95%} [-0.06, 0.14]),

as shown in Table 7(C); therefore, H2c was not supported. However, the indirect effect of strategic foresight on BMI via learning was significant ($a_2b_2 = \beta = 0.08^*$, $t = 1.86$, $p < 0.05$, BCa - CI_{95%} [0.02, 0.15]), as shown in Table 7(C); therefore, H3c was supported. Finally, the most significant indirect effect was via the sequential mediating effects of sensemaking and learning ($a_1a_3b_2 = \beta = 0.07^*$, $t = 2.30$, $p < 0.05$, BCa - CI_{95%} [0.03, 0.12]), as shown in Table 7(C); therefore, H4 was supported.

The effects of the control variables evaluated using PLS-PM are shown in Table 7(B). Notably, industry type was positively associated with BMI ($\beta = 0.21^*$, $p < 0.05$), suggesting that innovative industries such as engineering, R&D, and ICT tend to produce more new products and services, which necessitate more BMI. However, firm age ($\beta = 0.00$, $p > 0.05$), firm size ($\beta = -0.02$, $p > 0.05$), and location ($\beta = 0.02$, $p > 0.05$) were not associated with BMI, likely because of the research context. As Finland is a high-tech country, innovation usually occurs among all types of firms.

5. Discussion and conclusion

Research on strategic foresight (Fergnani, 2022) and BMI (Foss and Saebi, 2017) has proceeded as relatively separate streams, leading to a lack of knowledge about the nature of their relationship. This quantitative empirical study aimed to bridge these individual research strands by considering the mechanisms through which strategic foresight and BMI are connected. Specifically, our analysis investigated the direct link between strategic foresight and BMI and the mediating and sequential mediating effects of sensemaking and learning. Examining these

connections aimed to explain the intricate interplay between the influencing mechanisms of BMI and provide an empirically established basis for understanding how strategic foresight may promote BMI and overcome its barriers.

The results show that strategic foresight has a significant positive relationship with BMI (H1), indicating that the greater the strategic foresight level, the greater the BMI organizations achieve. Based on our earlier theorization, it is plausible that this positive connection first involves strategic foresight providing valuable input for developing a systematic approach to advance BMI. By mapping and influencing the future (Hines, 2020), the critical stages of the strategic foresight process can make the underlying structure and dynamics of the BMI system visible. This also has the potential to support the accumulation of all the necessary and radically new resources over time and facilitate more informed decision-making on resource allocation to restructure the internal processes for operating a new BM. Second, strategic foresight provides valuable inputs for enhancing the novelty of new BMs. Promoting the exploration and generation of a broader range of business and technological opportunities increases the likelihood of genuinely novel opportunities materializing as enhanced value creation, propositions, and capture. Hence, strategic foresight can be applied as an agile and novel approach to enhance BMI.

The findings provide further insights into the nature of the relationship between strategic foresight and BMI by examining the mechanisms that can affect the cognitive frames of the actors involved and reap the benefits of strategic foresight in fostering BMI. Our empirical evidence aligns with the findings of theoretical and qualitative studies that note that strategic foresight positively impacts sensemaking (H2a) (Dortland et al., 2014; Tapinos and Pyper, 2018) and learning (H3a) (Bootz et al., 2019; Chermack, 2005). This signifies that the strategic foresight process addresses mental models and knowledge gaps. It initiates change in thought and action and renews mental models about the future, thus improving sensemaking. Furthermore, strategic foresight enriches learning by providing knowledge about an organization's future internal and external environments. At the same time, sensemaking and learning function differently regarding BMI. Although earlier studies suggested the potential promotion of BMI (Andreini et al., 2021; Schneckenberg et al., 2022; Loon and Quan, 2020; Massa and Tucci, 2021), our findings indicate more complex connections. Learning and related creative leaps allow the organization to move beyond the scope of previous experiences when exploring new BMs (H3b and H3c). However, we find no significant relationship between sensemaking and BMI (H2b) and no mediating effect (H2c).

Learning is fostered by integrating various knowledge foundations from both the internal and the external environments shared by strategic foresight (Grant, 2003). Furthermore, communicating that knowledge within the organization can change the value creation, proposition, and capture activities of BMs. However, the insignificant direct and mediating effect of sensemaking on BMI may be driven by the fact that organizations often focus on a single meaning or perspective, which can be misleading and result in other possibilities being overlooked (Day and Schoemaker, 2004). This occurs, for instance, because of individuals' mental filters, which lead them to "force fit the world into their existing frames" (Day and Schoemaker, 2004, p. 138), as well as the dominance of the organization's logic, which can result in firms choosing not to pursue foresight outcomes (Klos and Spieth, 2021). This is also relevant to how knowledge is managed in uncertain environments. A state of uncertainty encourages managers to hide knowledge or be careful and selective with the information they share to protect their personal interest and avoid the imminent risk of being disadvantaged by changes in the routines (Arias-Pérez and Vélez-Jaramillo, 2021). However, sensemaking still has a role to play. Our sequential mediation analysis including sensemaking and learning provided the most important mediating effect (H4), with a significant path coefficient in the structural model. The interactive process of strategic foresight facilitates the sharing of the organization's mental model, mobilizes the internal forces

to challenge that model, results in deeper changes to the model, and eliminates blind spots in understanding alternative futures (Schwarz, 2009; Wright et al., 2013). This, in turn, leads to an efficient learning process that entails the exploration or exploitation of new BMs (Cunha et al., 2006). Therefore, the joint mobilization of sensemaking and learning can explain how organizations can better achieve BMI.

5.1. Theoretical contributions

As discussed earlier, while previous studies do not explicitly link strategic foresight to BMI, these concepts might be associated directly and indirectly through sensemaking and learning (Marinković et al., 2022; Massa and Tucci, 2021; Von der Gracht et al., 2010). However, empirical evidence, especially cross-industry studies, analyzing these possible individual relationships in a single model and examining how they might impact each other is lacking. Thus, the first contribution of this study to the extant literature is to examine this model and validate it quantitatively. Second, this study extends the literature on the mechanisms that facilitate BMI (Foss and Saebi, 2017; Amit and Zott, 2015; Huang and Ichikohji, 2023). It shows not only how strategic foresight is an influential factor for BMI on its own, but also how it supports other factors that can promote BMI, such as sensemaking and learning. We argue that strategic foresight can support BMI dynamics and positively influence those mechanisms that allow innovation to flourish. Therefore, this study contributes to the accumulating theory and opens the black box of the BMI phenomenon.

We verify that strategic foresight has a systematic process approach (Hines and Bishop, 2013; Hines, 2020) and an element of novelty for BMs (Patvardhan and Ramachandran, 2020; Rohrbeck and Gemünden, 2011), thereby promoting new modes of value creation, proposition, and capture. This systematic and flexible approach may help minimize or even eradicate structural barriers to BMI (Rudd et al., 2008; Ocasio, 2011). At the same time, the indirect connections between strategic foresight and BMI, where sensemaking and, especially, learning emerge, could remove cognitive barriers to BMI (Chesbrough, 2010; Berends et al., 2016). These barriers can be mitigated when mental models are changed, and knowledge gaps are bridged through sensemaking and learning. Managers can leverage this knowledge to manage uncertainty, seek new opportunities and strengthen resilience against high-risk environment and therefore provide a sense of direction and purpose and usefully guide the renewal of BMs (Guo et al., 2023; Saeed et al., 2023). Probing more deeply into the connection between strategic foresight and BMI, this study further identifies that various mechanisms may play different roles. While earlier studies suggest that sensemaking and learning support BMI (Loon and Quan, 2020; Massa and Tucci, 2021), this study suggests a distinction between the two. Learning seems to play a more pronounced role than sensemaking, as it partially mediates the impact of strategic foresight on BMI. Environmental dynamism and complexity compel organizations to change their future approaches to learning, as they are aware of their lack of understanding of such circumstances. To cope with such a challenge, strategic foresight can enhance organizations' exploration and preparation for a range of possible futures. Learning provides new knowledge and enhances the organization's understanding by questioning the dominant perceptions of individuals and building alternative representations of future value creation, proposition, and capture processes. Our findings reveal that sensemaking comes into play when learning is a mediator in the model, indicating that strategic foresight indirectly influences BMI by sequentially influencing sensemaking and learning. Such a sequential impact of strategic foresight has not thus far been systematically investigated. Therefore, our findings not only extend BMI theory, but also deepen knowledge on how strategic foresight can influence different outcomes in different settings.

Finally, in addition to testing our theory-driven model in which multiple constructs are considered simultaneously, this study introduces a strategic foresight process scale that can be applied in future research.

Quantitative research on strategic foresight remains sparse and needs testable constructs (e.g., Paliokaitė and Pačėsa, 2015; Van der Laan, 2021). This study offers a method to advance this field.

5.2. Practical implications

This study serves as a reference for business practice. First, it advocates strategic foresight as a useful approach for managers facing the arduous task of innovating their BMs, especially in turbulent and complex environments in which competitive advantage can rapidly disappear. Managers' awareness of and deliberate attempts to integrate strategic foresight into their BMI efforts are likely to be rewarded with advantageous outcomes. Applying strategic foresight to the BMI process yields better results than isolated attempts to innovate BMs. The resulting knowledge can enrich BMI and enable managers to navigate and go beyond the scope of their previous BMs (e.g., Moqaddamerad, 2020). The strategic foresight measure developed in this study can also be used as a managerial tool. It offers an integrated approach to strategic foresight and enables the evaluation of its state in organizations. Managers can easily and continuously renew their BMs by using the proper perspectives, methods, and techniques. They should thus seek a better understanding of the mechanisms that facilitate BMI. Equally importantly, strategic foresight can shift the focus of learning and sensemaking to future events by stimulating exploration. Managers with strategic foresight are likely to better cope with the inherent uncertainty of BMI, sense and seize opportunities to innovate, learn, and make wise decisions, and thereby implement effective strategies for BMI in changing environments (Mishra, 2023). Therefore, we recommend that managers allocate resources to increase their strategic foresight efforts and institutionalize strategic foresight in their organization over time as an essential mechanism for BMI.

However, the findings have wider implications for organizations by advising managers to pay attention to the roles that sensemaking and learning play in deriving value from fostering an organization's BMI and developing the capabilities to learn quickly and appropriately to make sense of changes and novel situations. By actively engaging in sensemaking and learning activities, organizations can develop clear knowledge to discover new opportunities and shape new advantages (Guo et al., 2023). Indeed, managers who promote sensemaking by organizing and structuring information and attempting to build insights and knowledge can benefit from BMI. Furthermore, those who pursue exploratory and exploitative learning can enhance new value creation, proposition, and capture activities as well as their strategic orientation more broadly (Mishra, 2023). Hence, the effective implementation of these managerial efforts boosts efficient BMI development. The integration of strategic foresight, sensemaking, and learning enhances managers' cognitive structure (mental models). As a result, these mechanisms can reflect the attributes of high-performing BMI. Thus, they can help managers develop novel and actionable insights, systematically enhance the fit among BMI building blocks, resolve uncertainty, identify advantageous resources, and provide superior positioning and competitive advantage relevant to the future. Thus, our study provides novel insights and guidance for managers in differently-sized organizations regarding how to promote BMI and overcome barriers to its effective implementation.

5.3. Limitations and future research directions

This study had several limitations that can serve as a foundation for future research. First, we used a relatively small sample ($n = 146$) and derived our data from a cross-sectional survey of senior managers. Using larger datasets in future studies would increase the predictive power of the model. Second, surveying only senior managers, which might have led to the overestimation of certain practices, may have affected the findings despite our attempts to control for these issues. Combined with the relatively broad measures for the studied constructs, we were unable

to optimally capture the variation in, for example, the strategic foresight processes that companies employ. Our strategic foresight scale encompasses the entire process instead of approaching specific methods that might be used in each stage. Thus, considering the heterogeneity of strategic foresight practices within organizations would be an interesting avenue for future research. Accordingly, dividing the strategic foresight process based on fine-grained methods and studying their practices and effects separately is recommended. Longitudinal studies should also elucidate the lengthy processes involved in strategic foresight and BMI. Further, we call for qualitative studies to gain in-depth views and nuanced explanations of the mechanics and dynamics underlying the relationships addressed in this study in different contexts like the entrepreneurial ecosystem. Third, while we rely on existing theorizing to evaluate the meaning of our findings on the nature of the relationship between strategic foresight and BMI, an in-depth empirical examination could reveal more about BMI promotion and the barrier-removing aspects of strategic foresight. Fourth, although our research might be replicated and compared with similar samples in a similar setting in other countries, future research could broaden the investigation to include countries in which the distribution of businesses across industries, innovativeness, and institutional environments may differ. Fifth, future research should consider the time horizon when studying strategic foresight and BMI. How does pursuing short-, medium-, and long-term strategies influence BMI? Finally, we selected potential mediators from the literature. However, strategic foresight and BMI may be connected in ways other than via learning and sensemaking. The extent to which additional mediating variables (e.g., absorptive capacity) and moderating factors (e.g., market turbulence and uncertainty) affect strategic foresight and BMI should therefore be further examined.

CRedit authorship contribution statement

Sara Moqaddamerad: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Murad Ali:** Formal analysis, Methodology, Visualization, Writing – review & editing.

Data availability

The data that has been used is confidential.

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