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Promoting supply market development by the dynamic capabilities of innovative public procurement

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ABSTRACT

Dynamic capabilities play an essential role in innovative public procurement. Innovative procurement activities may create an impact on supply markets by considering the needs of small- and medium-sized enterprises and other potential supplier firms. This study aims to examine how dynamic capabilities support innovative public procurement, aiming at positive supply market impacts. We empirically test our hypotheses using survey data collected from 197 public buyers in Finland. The results show that public procurement has a significant impact on the supply market by actively fostering innovation. This finding is novel, as such a phenomenon has only been observed empirically in the private sector literature. We found that dynamic capabilities – specifically seizing capabilities – have an impact on supply markets and that procurement participation in innovation is strengthened by seizing and transforming capabilities. We also show that sensing capabilities are antecedents of seizing and transforming capabilities, implying that public procurement needs to have these capabilities in order to innovate and develop the supply market. As a practical implication, we conclude that if public organizations aim for positive impacts on supply markets, they could invest in seizing capabilities in particular and engage in procurement participation in innovation.

1. Introduction

Public procurement has remarkable potential to develop the supply market. It can stimulate research and development (R&D) activity and increase innovation by actively introducing alternative products and services to customers and accelerating the implementation of new solutions, thereby developing the supply market (Caravella and Crespi, 2020; Edler and Yeow, 2016; Miller and Lehoux, 2020). The Organization for Economic Co-operation and Development (OECD) reports that demand-side public procurement policies to support innovation are attracting interest in many countries and are seen as effective ways to stimulate innovation and develop the supply market (OECD, 2017). Public procurement covers a wide scope of products and services delivered to the population (Uyarra et al., 2014) and is an important policy instrument for reaching broad political goals, such as promoting innovation (Harland et al., 2021; Georghiou et al., 2014).

At the same time, public procurement is still mostly price-focused, and small- and medium-sized enterprises (SMEs) are underrepresented as suppliers (European Commission, 2022) because they struggle to meet the criteria set by public buyers (Uyarra et al., 2014). These are indicators of public buyers' limited capabilities to realize the full potential of existing supply markets. In practice, the challenges are visible, for example, in implementing ambitious policy aims regarding innovations through procurement activities (Uyarra et al., 2014), such as determining supply market opportunities, setting flexible contract criteria, and identifying new opportunities during the contractual period. To enable innovative public procurement, it is necessary to embrace change that ultimately leads to the development of supply markets (i.e., positive supply market effects). Therefore, public organizations need new capabilities to engage procurement in innovation activities (Uyarra et al., 2014).

In change and renewal, organizations need high-level routines and capabilities that facilitate the understanding of the market, interpret market intelligence, and support them to configure responses (Teece

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et al., 1997; Teece, 2012). These are called dynamic capabilities (Teece et al., 1997), which are widely seen as necessary for creating change and renewal (Peteraf et al., 2013). Teece et al. (1997, p. 516) defined dynamic capability as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments," while Helfat et al. (2007, p. 4) stated that dynamic capability is "the capacity of an organization to purposefully create, extend, or modify its resource base." Dynamic capabilities have been found to support public organizations in coping with change (Piening, 2013) and are at the heart of innovation and innovativeness (Teece, 2007, 2012).

The dynamic capabilities view (DCV) (Teece et al., 1997) was originally developed from the perspective of building a sustainable competitive advantage for private companies, but it has also drawn research interest in the context of public organizations. In addition to competitive advantage, dynamic capabilities are suggested to improve the operational capabilities and performance of organizations (Piening, 2013). For example, Kattel and Mazzucato (2018) discussed innovation policies and dynamic capabilities in the public sector, and Trivellato et al. (2021) reported that the dynamic capabilities of the public sector enhance innovation activities that benefit the wider community of citizens; however, the latter suggested further empirical research on the topic. Although there is some existing research about dynamic capabilities in public sector organizations, research specifically in the context of public procurement is limited. Since the COVID-19 pandemic, studies on purchasing and supply chain management where the DCV is applied have increased, but the research is mainly from the viewpoint of creating resiliency for private sector companies (Kähkönen and Patrucco, 2022). This is surprising, as public organizations and their procurement activities face considerable dynamism through frequent policy changes (Piening, 2013) and multifaceted stakeholder goals (Argento et al., 2020). Exceptions are the studies by Mandal (2017), who explored the influence of hospital–supplier collaboration on hospital supply chain performance by utilizing the and Bleda and Chicot (2020), who investigated the formation of dynamic markets for creating innovations in which learning capabilities are seen as dynamic capabilities. Therefore, given the strong role and potential of public procurement to boost innovation (OECD, 2017; Uyarra et al., 2014), the role of dynamic capabilities in enhancing innovative public procurement should be examined in more depth.

Obwegeser and Müller (2018) stated that the DCV has great potential to investigate innovation structures within the field of public procurement, but according to Clausen et al. (2020), only a few studies on innovation and dynamic capabilities have been conducted in the public sector. Innovation can be understood as the creation, adoption, and development of new ideas or behavior patterns (Dewar and Dutton, 1986), and it implies a change aiming to respond to or influence the external environment (Damanpour, 1996). Innovative public procurement means implementing specific procurement methods or considering innovations in the call for tenders (Uyarra et al., 2017). In this study, the issue is investigated specifically from the viewpoint of involving procurement in innovation activities (Lintukangas et al., 2019). Few studies have demonstrated the benefits of innovative public procurement (Patrucco et al., 2017). In particular, research that provides empirical evidence is lacking, despite the emphasis on the potential of innovative public procurement to incentivize its adoption in the public sector. Specifically, the previous literature lacks a connection between innovative public procurement and supply market impacts. While the functional supply market has often been presented as an essential success factor for public procurement (Myoken, 2010; Obwegeser and Müller, 2018; Uyarra et al., 2014), few studies have investigated how it can be promoted. This is surprising as public procurement may also have detrimental effects on supply markets, for example, through the reduction of competition.

The aim of this study is to understand how dynamic capabilities support innovative public procurement and thus achieve positive supply market impacts. The DCV is used to analyze the capability of public procurement to sense markets, seize the opportunities detected in the market, and transform the procedures to respond to the requirements of innovative procurement while simultaneously supporting the growth and development of supply markets. This study seeks to answer two research questions: RQ1) *What is the impact of procurement participation in innovation on supply markets?* RQ2) *How do dynamic capabilities* support *procurement participation in innovation?* The study is based on survey data collected from 197 Finnish public buyers, and the analyses are conducted using Consistent PLS-SEM.

This study contributes to the literature by showing that positive supplier market impacts can be promoted by the dynamic capabilities of innovative public procurement. We contribute by introducing the construct of supply market impact and by showing that procurement participation in innovation has an impact on supply markets, which means that public procurement should consider the needs of the supply market, especially SMEs. This calls attention to the need for policies that support public organizations in building dynamic capabilities. We also contribute to the literature by demonstrating the interconnections and dependency of the three main clusters of dynamic capabilities—sensing, seizing, and transforming—in the context of purchasing and supply management and specifically in public procurement. We show that having sensing capabilities is not enough and that capabilities to seize and transform are needed to create a positive influence on procurement participation in innovation and supply markets. The results demonstrate that public procurement needs sensing, seizing, and transforming capabilities in order to be innovative and, ultimately, to develop the supply market.

2. Literature background and hypothesis development

2.1. Innovative public procurement contributing to supply market development

Public procurement can stimulate innovation in two different ways: by sourcing innovative products and services from suppliers and by fostering innovation in the procurement process, as public buyers aim to obtain solutions that do not yet exist but that can be developed (Aschhoff and Sofka, 2009; Saastamoinen et al., 2018). This research focuses on the latter approach. Innovative public procurement involves changes or advancements within the procurement process itself (Torvinen and Ulkuniemi, 2016).

Fostering innovation in the procurement process can be a critical foundation to drive innovation among suppliers and stimulate growth in the economy (Knutsson and Thomasson, 2014). Innovative public procurement practices modify the way suppliers are invited to provide new and improved solutions. It also promotes opportunities to invite new suppliers to participate in the procurement process (Torvinen and Ulkuniemi, 2016). Therefore, public procurement can foster innovative supply markets and support the development of SMEs and local companies (Grandia and Meehan, 2017). For this reason, it has been increasingly recognized as an effective means to promote innovation (Uyarra and Flanagan, 2010). In many countries, public procurement represents a considerable portion of governmental expenditures (Kistler et al., 2024), which is around 14 % of the gross domestic product in EU countries (Hoekman and Taş, 2024). Considering the vast reach of public procurement and its significant purchasing power, adopting innovative approaches can lead to job creation, stimulate economic growth, and foster a dynamic and innovative economy (European Commission, 2024).

Public policies for innovation can be categorized into demand- and supply-side strategies (Edler and Georghiou, 2007). Supply-side policies offer resources to promote innovation and accelerate innovation diffusion, whereas demand-side policies are classified into systemic policies, regulation, public procurement, and private demand support (Sumo et al., 2016). Although innovations generally originate on the supply

side (Edquist et al., 2015), demand has been demonstrated to be an important mechanism for fostering innovation (Uyarra et al., 2014), as it can transform societal needs into innovative solutions (Georghiou et al., 2014).

Private sector companies pursue innovation through purchasing to gain competitiveness and increase profit for the firm itself (Porter, 1985; Schmelzle and Tate, 2022), whereas public procurement involves a pluralistic nature of stakeholders (Cluley and Radnor, 2020) and has great potential to achieve a broad range of societal objectives (Harland et al., 2021). When private companies increasingly rely on suppliers to promote innovation and develop relationships with suppliers (Johnsen, 2009; Luzzini and Ronchi, 2011), public organizations must achieve public objectives and provide solutions to societal challenges in a highly regulated environment (Malacina et al., 2022). However, public buyers can stimulate the local economy and incentivize a great number of suppliers to develop innovative solutions and influence the supply market through demand-side policies requesting new products and services (Caldwell et al., 2005; Bleda and Chicot, 2020; Uyarra et al., 2020). The introduction of innovation in the public sector is considered slower than that in the private sector (Askfors and Fornstedt, 2018; Czarnitzki et al., 2020). Public organizations need to search for new solutions, capabilities, and ideas in the supply market, and determining whether the proposed solution will be found in the market can be difficult. Thus, public organizations need to conduct extensive research on the supply market (Edquist and Hommen, 2000). They can search for innovative solutions in the supply market by adopting specific and new means, such precommercial procurement (e.g., Edquist and Zabala-Iturriagagoitia, 2014) or public procurement of innovative solutions (e.g., Rigby, 2016).

Another major distinction is that the public sector is required to comply with governmental legislation. These legal obligations are established to ensure that public organizations conduct the procurement process with equality, transparency, and integrity (Grandia and Volker, 2023). As a result, contracts are awarded envisioning fairness and open competition (Erridge, 2007). The heavily regulated context can result in procurement process rigidity, making it difficult to obtain the desired outcomes (Karjalainen and Kemppainen, 2008; Knutsson and Thomasson, 2014). Thus, more innovative procurement approaches should be adopted to overcome these challenges (Saastamoinen et al., 2018). Although the public and private sectors approach innovative procurement differently, emphasizing that public procurement can drive innovation in both sectors is important (Aschhoff and Sofka, 2009).

2.2. Dynamic capabilities

Innovation ability is, in many studies (e.g., Chaudhuri et al., 2023; Santa-Maria et al., 2022), associated with an organization's ability to understand different needs from the market, in which both the abilities to sense the market and to react accordingly are needed. To be able to sense—whether it is sensing the customer market or sensing the supply market—organizations require the ability to scan, detect, learn, and interpret new opportunities from the market (Teece, 2007). By sensing the market and the signals coming from suppliers, competitors, and customers, organizations can scan what is happening in the market and how the market is evolving (Teece, 2007). Market information and market intelligence are needed for configuring response processes, but procurement organizations need to know how information can be interpreted and how supply market intelligence can be exploited; thus, dynamic capabilities are needed (Foerstl et al., 2021). In public procurement, sensing capability may be useful, for example, in the supply market consultation phase to ensure transparency and fairness, and in the inter-actor interaction phase to facilitate procurement success. The capacity to seize is needed to capture opportunities or neutralize the threats sensed from the market because seizing is about the ability to create organization-level decision-making procedures and structures (Teece, 2007, 2012), which manifest as activities, such as making timely decisions, improving responsiveness (Pu et al., 2023), and generating innovations (Maijanen and Jantunen, 2016). In public procurement, seizing capability may be important, for instance, in implementing procurement procedures with criteria that support innovation promotion. However, asset alignment and realignment are needed to renew resources so that an organization can respond to the changes and opportunities sensed from the market (Teece, 2007, 2012). This process is called transforming (or reconfiguring) (Teece, 2007), and it enables organizations to continuously update their capabilities for reconfiguring sources in order to capture and create competitive advantage (Teece et al., 1997). These dynamic capacities are latent, which means that they can be detected only if they are put into action and manifested as routines through which renewal happens (Kump et al., 2019; Peteraf et al., 2013). In public procurement, transforming capability may support, for example, the technological changes contributed by suppliers.

The capabilities of sensing, seizing, and transforming—which are the three main clusters of activities according to the DVC (Teece, 2007)—are path dependent by nature. According to Helfat and Peteraf (2009), all three are needed to respond to and carry out change. This dependency has also been tested in the empirical context of purchasing and supply chain management. For example, in their recent studies, both Pu et al. (2023) and Kähkönen et al. (2023) found that sensing capability has a positive impact on seizing capability, and further, seizing has a positive impact on transforming capability. However, Pu et al. (2023) found that sensing has no direct effect on reconfiguring, which confirms that the suggestion by Helfat and Peteraf (2009) that these capacities form an interrelated chain of activities also has been found evidence in the context of purchasing and supply chain management. Pu et al. (2023, p. 5) stated that "sensing capability is the primary condition for improving supply chain seizing and reconfiguring capability." Thus, following the idea of dependency and an interrelated chain of activities, and to test this in the context of public procurement, we hypothesized the following:

H1. Sensing capabilities are positively related to seizing capabilities.

H2. Seizing capabilities are positively related to transforming capabilities.

2.3. Benefits of dynamic capabilities in public procurement

Procurement participation in innovation in an organization refers to "purchasing professionals' collective ability to innovate and their openness to new ideas with the aim of influencing supply markets" (Lintukangas et al., 2019, p. 3). Therefore, innovativeness helps in adopting new procurement practices and changes in procurement processes, for example, when developing digital procurement capabilities (Hallikas et al., 2021; Herold et al., 2023) and adopting new collaborative approaches in contracting (Torvinen and Ulkuniemi, 2016). Innovative procurement can produce new ideas and participate in an organization's innovation process, for example, when developing public services (Holma et al., 2020). Procurement participation in innovation should be systematically developed and measured by management, and the procurement processes themselves should support finding new solutions (Lintukangas et al., 2019; Panayides and Lun, 2009; Seo et al., 2014). Trivellato et al. (2021) found that dynamic capabilities drive new approaches to work and interact with citizens and stakeholders in the context of collaborative innovation. Sensing the supply market, seizing opportunities by creating purchasing procedures and structures that facilitate the development of new ideas, and transforming resources are needed to create innovations. Thus, procurement participation in innovation benefits from dynamic capabilities.

It is widely acknowledged that public procurement can influence the development of the supply market (Bleda and Chicot, 2020). It can encourage R&D activity, introduce alternative products and services, develop the supply market toward innovations (Caravella and Crespi, 2020; Miller and Lehoux, 2020), and thus positively affect the supply

market (Chicot and Matt, 2018; Edler and Yeow, 2016). The role of the procurement function is to sense and detect developing opportunities, trends, and solutions arising from the supply market (Azadegan and Dooley, 2010; Mazzola et al., 2015), seize these opportunities and trends to form useable components, and finally transform them into applications for users (Teece, 2007, 2012). For example, improving sustainability requires redesigning the entire supply chain from supply market innovations to sustainable procurement practices (Schaltegger and Burritt, 2014; Malacina et al., 2022). Therefore, it can be concluded that the dynamic capabilities of procurement may have a positive supply market impact. Based on the above, it is argued that:

H3. Sensing capabilities are positively related to a) procurement participation in innovation and b) the impact on the supply market.

H4. Seizing capabilities are positively related to a) procurement participation in innovation and b) the impact on the supply market.

H5. Transforming capabilities are positively related to a) procurement participation in innovation and b) the impact on the supply market.

2.4. Innovative public procurement and its impact on the supply market

Innovative procurement activities can improve the performance of suppliers and supply markets through different means (Malacina et al., 2022). Organizations that succeed in developing innovation capability usually acquire external resources successfully, improve their ability to innovate, and influence performance positively (Clausen et al., 2020). Public procurement is responsible for ensuring that SMEs also have fair access to participate and that overly prescriptive requirements or prohibitive resource requirements do not form barriers to their engagement (Loader, 2015). The extension of the supply base to SMEs may also increase the share of local suppliers. Innovative public procurement can incentivize local SMEs because public buyers who conduct innovative procurement can strategically buy from local suppliers, thereby helping promote the local economy (Pazirandeh and Norrman, 2014). Linked to this, additional opportunities for growth that are derived from cooperation with public buyers become available for small suppliers. Innovative public procurement can also create opportunities for suppliers to operate in new and improved markets (Saastamoinen et al., 2020). This is possible through the improved business reputation that suppliers gain by cooperating with innovative public buyers (Malacina et al., 2022). Furthermore, healthy competition in the supply market can be achieved through procurement participation in innovation. It can promote free and open competition (Myoken, 2010). Finally, suppliers can exploit the gains from networking resources received from partners. For example, suppliers can have access to information and other valuable resources that can support the expansion of their markets (Talebi et al., 2021).

Public procurement supports knowledge coordination and interactive learning in the supply market, leading to innovation development and innovation diffusion. Public procurement influences different stages of market formation through each phase of the procurement cycle (Bleda and Chicot, 2020). For example, in the market formation phase, public procurement promotes new ideas to businesses, supports identifying markets with potential users, establishes outcome-based specifications, and creates suitable regulatory conditions. In the adoption phase, public procurement promotes the alignment of suppliers' and users' knowledge through the involvement of users in the early stages of the procurement process. Tendering and evaluation also allow co-adaptation, interactive learning, and experimentation. In the final stage of market formation, public procurement enables innovation retention through the coordination of activities and the provision of incentives (Bleda and Chicot, 2020). Therefore, procurement participation in public sector innovation can positively develop supply markets. Thus, we argue that:

H6. Procurement participation in innovation has a positive impact on the supply market.

We deliberately distinguish between the concepts of market stewardship and supply market impact. Market stewardship is a macro-level concept that encompasses the management and regulation of procurement activities to achieve broader societal, economic, and environmental goals (Morais and Santos, 2024). In our study, we define supply market impact as a potential consequence of innovative public procurement. The supply market impact can be demonstrated by showing how procurement can support local SMEs (Grandia and Meehan, 2017), encourage suppliers to explore new market opportunities, and its role in promoting competition (Caldwell et al., 2005).

Fig. 1 presents the research model and hypotheses of this study. The main idea is to understand how dynamic capabilities support procurement participation in innovation, eventually leading to positive supply market impacts. In addition to the main research variables, the study includes the size of a buyer organization as a control variable, as it may explain the level of innovativeness and supply market impacts.

3. Methodology

3.1. Data collection

A web-based survey was conducted to collect data in the autumn of 2022. Public procurement in Finland is a suitable topic for capability-related research, as it has average or satisfactory levels of performance in many indicators of innovativeness, equal treatment, nondiscrimination, and transparency compared to public procurement in other EU countries (European Commission, 2021, 2022). The survey targeted public buyer organizations, such as registry offices, using a sampling frame provided by a third-party service provider specializing in public procurement research. The sample consisted of procurement specialists from the registry offices of municipalities, healthcare districts, and parish unions. The identification of multiple respondents from a single organization was an intended sampling strategy. The goal was to engage a diverse group of respondents who actively participate in public procurement, including those responsible for procurement activities, governance, project management, and subject matter expertise. The perceptions representing these different roles were essential to obtain a reliable overview of the procurement capabilities and activities present at various units and strategy levels of the studied organizations.

Before the survey was distributed, it underwent a thorough two-step review process. First, the survey was reviewed by two experts from a professional survey study provider. This resulted in a few changes involving streamlining specific statements and making their wording understandable to the intended practitioner population. The second step included testing by the representatives of the intended population, specifically the head of the procurement department of a large governmental organization, the procurement manager of a major Finnish city, and the director of purchasing services at the Finnish Regional Welfare Association. The overall conclusion based on the evaluation of these experts was that the survey was well designed and easily understandable for the potential respondents. However, based on the feedback received, additional instruction for respondents was added, and the wording of a few background questions was changed to reflect the language used in the organizations.

The survey was administered in Finnish to ensure accurate responses. For the purpose of maintaining questionnaire fidelity, it was initially developed in English, translated into Finnish by a professional translator, and then back-translated into English to verify consistency. A total of 860 professionals from 321 distinct public organizations were invited to participate in the survey. In cases in which initial email inquiries received no response, follow-up communication was made by the service provider via telephone. The non-response bias was examined by comparing the responses between these two groups with a *t*-test for all the studied constructs. The results revealed no significant differences between the groups, indicating the absence of non-response bias. The survey achieved a high response rate of 23 % (200 out of 860 surveys

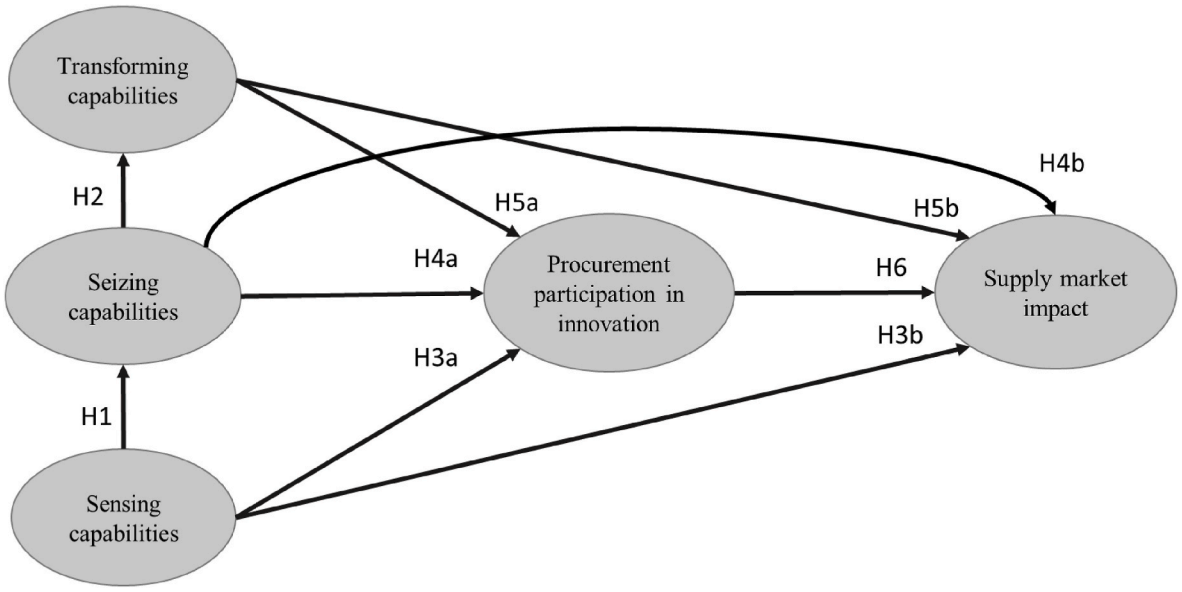


Fig. 1. Research model and hypotheses.

were emailed). Expectation Maximization (EM) missing value imputation method was applied to missing values in the data (Little and Rubin, 1987; Olinsky et al., 2003). EM is a model-based missing value treatment procedure that includes an iterative process continuing until a convergence is reached in the parameter estimates (Karanja et al., 2013; Tsikriktsis, 2005). EM, as a sophisticated maximum likelihood method, can also be used in situations when there are more than 10 % missing values in the data (Tsikriktsis, 2005). The Little's MCAR test was applied to check that missing values were missing completely at random. The test was non-significant (Sig. = 0.321), suggesting that all missing data replacement methods can be applied (Hair et al., 2014). After the missing value imputation, the useable number of responses was 197. Most of the respondents were representatives of municipalities or cities, but national-level agencies, such as government offices, were also covered. Many of the respondents worked with multiple supply categories, including information technology, goods, and services. Different sizes of organizations were present. The respondents' descriptive profiles are provided in Appendix 3.

3.2. Measurement of research constructs

All measurement items were presented as 5-point Likert scales (1 = strongly disagree and 5 = strongly agree), except for the control variable. We used multiple items as indirect reflective indicators for the constructs. A detailed description of the scales and items is presented in Appendix 1. The indicators for the dynamic capabilities of sensing, seizing, and transforming were based on the scales of Kump et al. (2019). We made a few changes to these items so that they would fit the context of public procurement. For example, sensing the market situation was modified to sensing the supply market situation. Procurement participation in innovation is defined as how innovative procurement is done in a respondent's organization and is measured mostly in alignment with the scale by Lintukangas et al. (2019). The fifth item is not the same as the original, as public organizations do not always have an R&D function. Procurement participation in innovation reflects the idea of innovative public procurement, which is the focus of this study.

As no existing scales were available, a supply market impact scale based on the literature review on value-creating public procurement by Malacina et al. (2022) was created for the purposes of this study. Supply market impact describes improvements in supply markets and is based on the respondents' perceptions. New and improved market opportunities, networking and competition among firms, and business growth are the themes included in supply market impact (see Grandia and Meehan, 2017; Caldwell et al., 2005). We used organization size as a control variable, which was measured with a single item that had predefined ranges for the organizational sizes of the respondents' organizations.

3.3. Analysis

Data analysis was performed using the statistical software IBM SPSS Statistics 24 and SmartPLS 4. The data were analyzed using Consistent PLS-SEM (PLSc) analysis with 5000 rounds of bootstrapping. PLS is an estimation technique that aims to maximize the explained variance. This technique is suitable for complex models (Sumo et al., 2016), as in our study. The specific characteristic of PLSc is that it corrects the correlations of reflective constructs to make results consistent with the factor model. The basic descriptive statistics of our data are presented in Table 1. All the Pearson correlations were significant at the 0.01 level.

All constructs used in the study were reflective, and their internal consistency and reliability were assessed using composite reliability (CR), average variance extracted (AVE), and factor loadings (Hair et al., 2014). All the outer loadings in the survey items were over 0.6. with only one exception. The first item of Supply market impact dealing with procurement from local small suppliers received the loading of 0.380 and was dropped out from further analysis. The CR values ranged from 0.85 to 0.89, exceeding the threshold of 0.7. The AVE values varied between 0.62 and 0.70, surpassing the 0.50 threshold (Fornell and Larcker, 1981). The Cronbach's alphas for all items were above 0.7, as recommended by Hair et al. (2014). The Appendix provides a more detailed overview of the loadings and construct quality criteria.

The heterotrait-monotrait (HTMT) ratio was used as an indicator of

Table 1
Descriptive statistics of the data.

Construct correlations	1.	2.	3.	4.	5.
1. Sensing					
2. Seizing	0.63				
3. Transforming	0.53	0.60			
4. Innovativeness of procurement	0.42	0.54	0.56		
5. Supply market impact	0.33	0.52	0.46	0.48	
Means	3.25	3.23	3.18	2.55	2.92
Standard deviations	0.72	0.74	0.83	0.80	0.85

discriminant validity. The relationships between all constructs had HTMT values below 0.85 (the highest being 0.741), indicating high discriminant validity (Hair et al., 2017). Multicollinearity was assessed using the variance inflation factor (VIF), which ranged from 1.0 to 2.1 and was well below the threshold of 10 (Duzan and Shariff, 2015). Furthermore, VIFs were clearly below the threshold of 3.3, which indicates the absence of common method bias (Kock, 2015). The effect size of the relative impact of an exogenous latent variable on an endogenous latent variable was assessed using Cohen's test (Hair et al., 2014). These findings are further described in the Results section.

A robustness check for the results was done by using covariance-based SEM (CB-SEM) with Stata 18.5 (see Appendix 4). CB-SEM model did not use data with missing values imputed by EM, but instead, it addresses missing values using the mlmv-command within the SEM-command. This command uses FIML (full information maximum likelihood) that does not create or impute any data, it only analyses existing data (Allison, 2003). This was done to demonstrate robustness, showing that results remain consistent even with different treatments of missing values. The results of the hypothesized relationships remained mostly the same. There were lower significance levels in H4a, H4b, and H6 because our data did not fully meet the assumptions for CB-SEM (e.g., sample size vs. model complexity) (Jackson, 2003).

Marker variable analysis was used to test common method bias (Rönkkö and Ylitalo, 2011). The analysis began by examining the correlations among all survey variables. The Likert scale variable measuring the number of suppliers was defined as a marker variable. This variable was part of the survey but was not one of the research constructs. The number of suppliers is not expected to be connected with the research constructs, as it characterizes the supply network but not the buyer organization aspects covering the essence of the main constructs. Correlation analysis revealed a relatively low and mostly positive but not significant correlation between the marker variable and the research constructs. The inclusion of the marker variable as a predictor of the endogenous variables in the model confirmed no significant relationships with the marker variable. With the marker variable in place, the results of the hypothesized relationships remained the same. Only small changes to the betas were identified (0.01 was the largest). As a result of this examination, we concluded that common method bias should not be a major issue in our study.

4. Results

Fig. 2 summarizes the main results regarding the hypotheses of this study. The control variable organizational size did not have a significant relationship with any of the endogenous variables. More detailed information on the results, including the control variable, can be found in Appendix 2.

Overall, the model shows very strong relationships between the hypothesized connections between dynamic capability constructs, lending support to H1 and H2. Sensing capabilities are positively related (β = 0.737***) to seizing capabilities, which, in turn, are positively related (β = 0.701***) to transforming capabilities. The effect size (F^2) of these relations is large (0.35 or higher) (Hair et al., 2017).

Sensing capabilities are not related to procurement participation in innovation or supply market impact, meaning that H3a and H3b are not supported. Seizing capabilities are positively related to both procurement participation in innovation (β = 0.373**) and supply market impact (β = 0.398***), which supports H4a and H4b. The effect size (F^2) for these significant relationships is small (0.02 or higher) (Hair et al., 2017). Transforming capabilities have a strong positive relationship (β = 0.389***) with procurement participation in innovation but no significant relationship with supply market impact. This leads to the conclusion that H5a is supported and H5b is rejected. The effect size (F^2) for H5a is small (0.02 or higher) (Hair et al., 2017).

Procurement participation in innovation is positively related (β = 0.240*) to supply market impact, meaning that H6 is supported. The effect size for the relationship is small (0.02 or higher) (Hair et al., 2017). Overall, the model explains 40 % of the variation in seizing capabilities, 37 % of the variation in transforming capabilities, 40 % of the procurement participation in innovation, and 36 % of the supply market impact. The predictive relevance (Q^2) of the model is high (0.39) for seizing capabilities, medium for transforming capabilities (0.25) and procurement participation (0.17) in innovation, and small (0.10) for supply market impact (Hair et al., 2017).

5. Discussion and conclusion

This study investigated how the development of the supplier market can be promoted by the dynamic capabilities of innovative public procurement. Procurement participation in innovation supports the creation of new ideas and solutions required to address societal needs (Miller and Lehoux, 2020). However, public procurement needs dynamic capabilities to be innovative. Thus, we applied the DCV as a theoretical lens to analyze the capability of public procurement to first sense the markets, then seize the opportunities spotted from the market, and finally transform the procedures to be able to respond to the

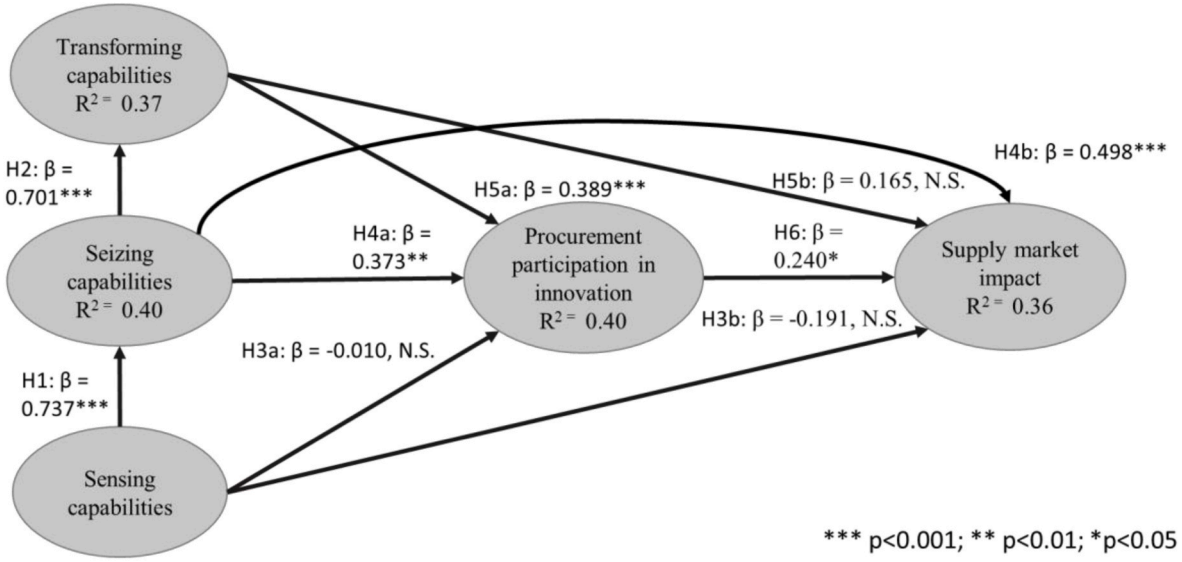


Fig. 2. Main results.

requirements, renew, and contribute to the development of supply markets. Dynamic capabilities have received increasing attention in the context of public organizations (Panagiotopoulos et al., 2023; Piening, 2013), but research that explores dynamic capabilities in public procurement remains limited. Public procurement is responsible for a significant volume of purchases, thereby playing a key role in creating important advances in society and enhancing innovation (OECD, 2017; Uyarra et al., 2014). Thus, the ability of public procurement to develop the supply market is critical to understand.

5.1. Theoretical contributions

As the first theoretical contribution, this study shows that innovative public procurement can lead to the development of the supply market. Public procurement may involve actions that have an impact on supply markets, which has often been suggested in the existing literature (e.g., Albano et al., 2015; Malacina et al., 2022; Pazirandeh and Norrman, 2014). Nevertheless, to the best of our knowledge, this paper is the first to demonstrate it quantitatively. At the same time, innovative approaches to public procurement have been introduced (Rigby, 2016), but there is limited understanding of their performance implications. The findings of this study bridge these gaps in the literature by demonstrating that procurement participation in innovation positively influences the actions of public buyers to affect supply markets, including ensuring the participation of SMEs (H6). Public buyers should be able to capture innovative suppliers' points of view. These positive benefits are particularly associated with seizing capabilities because a buyer's ability to understand market information is necessary to enable innovativeness and the development of supply market.

The second theoretical contribution relates to the demonstration of the benefits of dynamic capabilities in the context of public procurement. Earlier studies on dynamic capabilities in the public sector have identified their importance in innovation promotion (Bleda and Chicot, 2020; Wirtz et al., 2021), among other performance benefits, such as organizational effectiveness and efficiency via operational capability building (Piening, 2013). However, the importance of dynamic capabilities, specifically in innovative public procurement and their performance implications, has received limited attention thus far. Although dynamic capabilities show dependency on one another, their effects on the other variables of the model studied vary. We found that sensing capabilities have a non-significant influence on supply market impact (H3c) and procurement participation in innovation (H3a). This shows that having sensing capabilities is not enough and that capacities to seize and transform—those that facilitate the use of market information—are also needed. Pu et al. (2023) found sensing capability as a primary condition for improving supply chain seizing and reconfiguring capability, and Kähkönen et al. (2023) state that sensing might not be easily transformed into actions of procurement and supply chain management. This also aligns with the findings of Grimbert et al. (2024) that the execution of market analysis and early market engagement (sensing capabilities) might add a tendency to prescribe solutions and their performance instead of functional requirements that support innovation. Moreover, influencing the structure of the supply side (i.e., impact on supply markets) are activities that are connected with developing an innovation strategy rather than the initial execution of market analysis (Grimbert et al., 2024).

Dynamic capabilities are positively related to innovations in business studies, as seizing opportunities facilitate resource orchestration and overcoming inertia and path dependency (Huang and Li, 2017; Teece, 2007). Similarly, in the field of public procurement, we found that seizing capabilities have a positive impact on procurement participation in innovation (H4a). Seizing capabilities drive public buyers' impact on supply markets (H4c), and well-functioning and developed markets ensure versatile external resources, information, and expertise. Public buyers can positively influence markets and provide systemic opportunities for innovation (Miller and Lehoux, 2020) if they have seizing capabilities. Transforming capabilities also have a positive influence on procurement participation in innovation (H5a). However, procurement participation in innovation requires a change in procurement from an operational function to a more strategic function (Patrucco et al., 2023) in which transforming capabilities are needed. Fainshmidt et al. (2016) found that dynamic capabilities entail a change in the organization in several ways, and our contribution confirms that the innovativeness of procurement is one of these changes. Against hypothesized, transforming capabilities were not found as direct antecedents of supply market impact (H5b). Instead, they first need to support procurement participation in innovation, which in turn results in supply market impacts. Fayos et al. (2022) proposed that the public sector could promote dynamic capabilities by requiring these skills from suppliers, and our results suggest that public buyers' own dynamic capabilities do not necessarily have a direct positive impact on supply markets.

This study also sheds light on dynamic capabilities in purchasing and supply management in general and public procurement in particular by demonstrating the interconnections and dependency of the three main clusters of activities—sensing, seizing, and transforming—that form dynamic capabilities. Although the original literature on dynamic capabilities is based on the idea of the dependency of these capacities (Helfat and Peteraf, 2009; Teece, 2007), it has only rarely been demonstrated. Our results show that buyers' sensing capabilities are antecedents of seizing capabilities (H1), which are, in turn, antecedents of transforming capabilities (H2). This result is similar to the findings by Kähkönen et al. (2023) and Pu et al. (2023), who, however, conducted their research in the context of private sector purchasing. Our results confirm that dependency also exists in the activities of purchasing and supply management and specifically in public procurement. Although sensing capacity does not directly affect supply markets, it may boost the benefits of seizing and transforming capabilities; together, these promote supply market development.

5.2. Managerial and policy implications

Several managerial and policy implications for public procurement arise from this research. Because of the highly regulated environment and the public procurement principles of equality and transparency, organizations may be reluctant to promote innovative public procurement in fear of too close cooperation with the supply market. The inflexibility of the procurement process and regulations are often considered barriers to innovative procurement. Therefore, policymakers must support public organizations by creating policies and guidelines to develop procurement activities in new directions and to build new high-level capabilities that achieve innovative procurement targets. Common training courses are inadequate, as this initiative requires wide organizational resources, empowerment (Miller and Lehoux, 2020), cumulative experience gathered through learning-by-doing, and long-term commitment, among other things (Schilke et al., 2018). In addition to innovative procurement, the existence of dynamic capabilities supports supply markets in being active participants of innovative activities, ultimately leading to supply market development. Focusing on single types of dynamic capabilities, such as the ability to sense supply market offerings or seize up-to-date supply market information, does not suffice, as the capabilities are dependent on and support one another. For example, new supply market offerings need to first be identified (sensing), analyzed (seizing), and implemented in changed procurement activities (transforming). Therefore, making the investments needed for building and developing dynamic capabilities has many benefits, not only directly to the buying organization but also to supply markets and suppliers.

A healthy and competitive market is one of the goals of the public sector (OECD, 2017). Policymakers should therefore ensure that sufficient resources (a skilled workforce and properly sized budgets) are allocated to procurement in order to achieve the set policy objectives. Limited financial and human resources in procurement offices are often

the result of short-term cost-cutting by public administrations (Miller and Lehoux, 2020). However, procurement intermediates between public service users and suppliers and delivers opportunities for innovations (Miller and Lehoux, 2020) through supply markets. Thus, its role in creating public value should also be acknowledged (Malacina et al., 2022). The development of supply markets requires long-term procurement strategies connected with policymaking, which may include investments in new capabilities. Our findings suggest that dynamic capabilities are essential to facilitating suppliers' engagement in innovative procurement, affecting the supply market positively. The findings also demonstrate that relevant results in developing supply markets can be obtained by focusing on dynamic capabilities and procurement participation in innovation, and these should be supported by public procurement policies.

5.3. Limitations and future research

Some limitations of this study need to be acknowledged. Causality between the studied constructs cannot be fully confirmed, as this was not a longitudinal study. Buyer perceptions of supply market impacts may be somewhat biased and could be complemented by supplier perceptions. It should also be noted that the sample consisted only of respondents from the Finnish public sector. The national context thus limits the study, and more empirical research is needed, for example, at the European level and in other countries. Furthermore, few survey studies have been conducted on dynamic capabilities in the context of public procurement (see, e.g., Panagiotopoulos et al., 2023). Quantitative studies concentrating on the operationalization and measurement of dynamic capabilities in the context of public procurement would be welcome. Future research could also focus on ways to develop different dynamic capabilities within procurement. Other types of performance benefits of dynamic capabilities, such as the effectiveness of public services, could likewise be included in future studies. The construct of procurement participation in innovation reflected the perspective of purchasing and supply management on innovations and participation in it, and future studies could also examine the construct from an output perspective by focusing on how organizations achieve different goals related to it. Like dynamic capabilities, studies focusing on the operationalization and measurement of procurement participation in innovation in the context of public procurement would be needed, as the existing scales are mainly from the perspective of private sector organizations. This study covered various forms of public services and organizations, while different areas of the public sector may have specific characteristics. Future studies could analyze the findings by separating different types of public organizations, or they could delve in depth into locational characteristics regarding the role of dynamic capabilities in innovative public procurement. One recommendation of future research is the inclusion of the sales personnel's perspective regarding supply market impacts. Furthermore, as this study has provided the initial evidence on the phenomenon of supply market impact, future research could delve deeper and explore the other antecedents and factors that may exist. These would build more solid research on both the supply market impact and public procurement.

CRediT authorship contribution statement

Anni-Kaisa Kähkönen: Writing – original draft, Visualization, Conceptualization. **Aki Jääskeläinen:** Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Elina Karttunen:** Writing – original draft, Methodology, Data curation, Conceptualization. **Carolina Belotti Pedroso:** Writing – original draft, Conceptualization. **Katrina Lintukangas:** Writing – original draft, Conceptualization.

Declaration of competing interest

None.

Appendices.

Appendix 1. Scale items

Construct	Item	Loading	CR	Cronbach's alpha	AVE
Sensing capabilities (modified from Kump et al., 2019)	Our organization has state-of-art knowledge of supplier market offerings.	0.846	0.854	0.845	0.622
	Our organization is up-to-date on the current supplier market situation.	0.812			
	Our organization systematically searches for information on the current supplier market situation.	0.819			
	As an organization, we know how to access new external information.	0.812			
	Our organization always has an eye on other public sector organizations' activities.	0.637			
Seizing capabilities (modified from Kump et al., 2019)	We are able to quickly absorb new information from outside our organization.	0.814	0.847	0.845	0.681
	We are able to identify the information we need.	0.825			
	We are able to utilize suppliers' expertise in creating product and process innovations.	0.831			
	We use up-to-date supplier market information in the development of new services.	0.833			
Transforming capabilities (modified from Kump et al., 2019)	We are able to implement manifold procurement development projects such as IT or project development.	0.800	0.891	0.882	0.680
	We define clear responsibilities for implementing procurement development plans.	0.852			
	Regardless of unexpected interruptions, procurement development projects are consistently completed in our organization.	0.852			
	We have demonstrated our ability in implementing procurement-related changes.	0.859			
	In our organization, changes can be put into practice alongside daily tasks.	0.757			
Procurement participation in innovation (modified from Lintukangas et al., 2019)	The purchasing process supports finding innovative solutions.	0.789	0.883	0.878	0.624
	Supply management participates in the innovation processes of an organization.	0.824			

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Construct	Item	Loading	CR	Cronbach's alpha	AVE
	The capability to innovate in supply management is systematically developed.	0.822			
	Goals and measures related to innovations are set for supply management.	0.674			
	Purchasing function participates in the development of services.	0.795			
	Supply management coordinates and facilitates new ideas in the organization.	0.826			
Supply market impact	Procurement resulted in a high degree of local purchases from small suppliers.	0.380	0.854	0.854	0.697
	Procurement encouraged suppliers to explore new market opportunities.	0.828			
	Procurement promoted healthy competition among suppliers.	0.757			
	Procurement has enabled networking among small suppliers.	0.886			
	Procurement has facilitated the growth of small suppliers	0.862			

CR = composite reliability; AVE = average variance extracted.

Appendix 2. Detailed tables of results

Antecedents of Seizing

Antecedent	PLS SEM analysis results					Conclusion
	β	VIF	t-value	Significance (p-value)	F^2	
Sensing	0.737	1.006	15.196	0.000	0.651	H1 supported
Organization size	0.048	1.006	0.828	0.408	0.004	
R^2	0.400					
R^2adj	0.394					

Antecedents of Transforming

Antecedent	PLS SEM analysis results					Conclusion
	β	VIF	t-value	Significance (p-value)	F^2	
Seizing	0.701	1.010	11.749	0.000	0.579	H2 supported
Organization size	−0.053	1.010	0.766	0.692	0.002	
R^2	0.367					
R^2adj	0.360					

Antecedents of Procurement participation in innovation

Antecedent	PLS SEM analysis results					Conclusion
	β	VIF	t-value	Significance (p-value)	F^2	
Sensing	−0.010	1.769	0.089	0.929	0.003	H3a not supported
Seizing	0.373	2.005	2.656	0.008	0.072	H4a supported
Transforming	0.389	1.683	3.683	0.000	0.127	H5a supported
Organization size	−0.119	1.006	1.855	0.064	0.019	
R^2	0.396					
R^2adj	0.383					

Antecedents of Supply market impact

Antecedent	PLS SEM analysis results					Conclusion
	β	VIF	t-value	Significance (p-value)	F^2	
Sensing	−0.191	1.775	1.365	0.172	0.004	H3b not supported
Seizing	0.498	2.194	3.630	0.000	0.082	H4b supported
Transforming	0.165	1.897	1.440	0.150	0.026	H5b not supported
Procurement participation in innovation	0.240	1.655	2.557	0.011	0.052	H6 supported
Organization size	0.048	1.032	0.746	0.456	0.004	
R^2	0.358					
R^2adj	0.341					

Appendix 3. Respondents profile (N = 197)

Respondents profile	Percentage (%)
Organization size	
Below 50	17.95
50–250	25.00
251–1000	28.21
Over 1000	28.85
Organization type	
Municipality/City	47.13
Ministry	7.01
Government office	18.47
Religious	9.55
Healthcare	5.73
Educational	3.18
General purchasing body	5.10
Other	3.82
Major supply categories	
Goods	81.53
Construction work	47.77
IT	71.97
Health care	35.67
Service (other than health care)	71.34

Appendix 4. CB-SEM results

CB-SEM was used to compare the results run with PLSc and to assess the robustness of the main results. The complexity of the model and limited N did not allow to use CB-SEM as the main analysis method. In CB-SEM, the sample size should be more than 10 times the number of free model parameters (Jackson, 2003). Our CB-SEM model has too many free parameters (more than 300) for our sample size (197), which causes reduced power to detect true effects such as significant paths. The results support the hypothesis of this study, as the table below shows.

Hypothesis	Path	b	*CB SEM* p	*PLS-c* b	*PLS-c* p	Conclusion for method comparison
H1	Sensing → Seizing	0.506	0.000	0.737	0.000	Equals
H2	Seizing → Transforming	0.787	0.000	0.701	0.000	Equals
H3a	Sensing → Procurement participation in innovation	−0.023	0.770	−0.010	0.929	Equals
H3b	Sensing → Supply market impact	−0.199	0.090	−0.191	0.172	Equals
H4a	Seizing → Procurement participation in innovation	0.361	0.017	0.373	0.008	CB statistically significant at $p < 0.05$
H4b	Seizing → Supply market impact	0.449	0.035	0.498	0.000	CB statistically significant at $p < 0.05$
H5a	Transforming → Procurement participation in innovation	0.391	0.000	0.389	0.000	Equals
H5b	Transforming → Supply market impact	0.101	0.515	0.165	0.150	Equals
H6	Procurement participation in innovation → Supply market impact	0.311	0.053	0.240	0.011	almost statistically significant at $p < 0.05$

n: not significant; * statistically significant at $p < 0.05$.
** statistically significant at $p < 0.01$; *** statistically significant at $p < 0.001$.
Estimator for CB-SEM = Maximum likelihood with missing values.

After freeing the measurement error covariance between two indicators, the model fit increased. Development of services (item 5 in Procurement participation in innovation) and coordination of new ideas in the organization (item 6 in Procurement participation in innovation) share the idea of developing new entities rather than just participating or supporting the process. That is why this addition based on modification indices is theoretically understandable.

The model fit statistics for CB-SEM are shown in the table below. The chi-square of the baseline indicates that our model fits better than the null model. The result of RMSEA indicates a moderate fit. CFI and TLI values close to 1 indicate a good fit, and our model fits the data reasonably well according to these statistics. The model explains approximately 92.1 % of the variance in the outcome variable supply market impact.

Model fit statistics for CB-SEM

estimator	maximum likelihood with missing values (mlmv)
observations	191
Likelihood ratio chi2_ms(261)	533.360 model vs. saturated

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estimator	maximum likelihood with missing values (mlmv)
p > chi2	0.000
chi2_bs(300)	2617.107 baseline vs. saturated
p > chi2	0.000
Baseline comparison	
CFI	0.882
TLI	0.865
Modeling error	
RMSEA	0.074
Size of residuals	
CD	0.921

Data availability

Data will be made available on request.

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