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Guidance on how to balance the purchasing environment and processes to save resources - a validity examination of a holistic model

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ABSTRACT

Despite the evolution of purchasing operations over many years, a comprehensive perspective is lacking in practice, leading to inefficiencies. This study aims to validate a model designed to guide how to balance the purchasing environment. It comprehensively delineates the general pattern (a map) of real-life purchasing procedures and standardizes these elements to provide clarity and coherence. The model's novelty lies in the thoughtful selection and arrangement of factors, and their classification into two groups forces and drivers. This facilitates a structured approach to analyzing purchasing status through a checklist. By mapping purchasing activities, the model connects issues to its factors. After identifying existing weaknesses in operations by this linkage among the model's elements and problems, the framework serves as a valuable diagnostic tool supporting managerial decisions and enhancing efficiency. The validation study comprised case studies and survey research conducted at five multinational companies, involving over 130 purchasing professionals. Research proved the model's validity in terms of correctness, completeness, and applicability.

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1. Introduction

Ensuring a continuous supply today is more challenging than in the past when business processes were better predictable. Thus, companies must develop practices and processes to secure the sustainability of their purchases and to mitigate risks arising from supply chains (Hallikas et al., 2020; Miemczyk & Luzzini, 2019; Gualandris et al., 2014). Therefore, it is vital to analyze and balance purchasing¹ processes by managing and improving organizational capabilities (Maier et al., 2012) with special regard to the changes in the supply chain that impact the purchasing environment (such as the appearance of advanced services accelerating servitization, effects of blockchain mechanism etc) as suggested by several studies comprised in Rana (2022).

Purchasing, acting as a connection point of several areas by procurement services, entails factors that comprehensively depict its realm and are specific to this domain only such as supplier management (Carter et al., 2000; Wittinger, 2022). To aid procurement practice, these factors must be revealed, and their status analyzed to create a balanced and comprehensive picture for purchasing operations. However, as research confirmed, there is little guidance on how to achieve this goal. Therefore, it would be worthwhile to employ a validated tool that can assist in examining the environment at the purchasing operation level and studying the factors and their interactions as suggested in Bals et al. (2018). In addition, a validated tool assures that the original intention of the author (when setting up a concept) coincides with the understanding of those model's appliers. As such, this condition proves the correctness of the concept (Maier et al., 2012).

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In the literature, there is an immense number of articles related to purchasing. Additionally, we encountered a substantial body of papers that have introduced or defined various models or concepts related to various aspects of purchasing processes. The advantage of such a purchasing model should be similar to that of strategic models such as the Balanced Scorecard (Robert S. Kaplan & Norton, 2006), or Porter's 5 forces model (Porter, 2008). These models provide strategic support for leaders to assess their companies' performance by reviewing a standardized set of factors that impact decisions.

In this study, researchers aim to validate a holistic purchasing model that provides guidance on balancing the purchasing environment and processes. The recently developed Four Forces and Four Drivers (4F4D) model (Wittinger, 2022) is validated at five multinational companies by conducting interviews with purchasing executives and using survey for purchasing subordinates. The primary endeavour of the authors was to assess the model in real-life practice.

The article's structure is as follows: the subsequent section briefly reviews the literature connected to the model's factors (forces and drivers). Then the 4F4D model is introduced, followed by a comparison between the 4F4D model and a set of conceptual models related to purchasing. This is followed by the research questions and hypotheses, methodology and data collection. Then, the presentation of results, subsequent discussion, practical implications, and closing remarks are provided.

2. Literature review on the factors of purchasing environment

A comprehensive literature review was conducted by Wittinger (2022) to establish the 4F4D framework, providing a detailed exploration of the four forces (requestors, suppliers, internal regulations, and external rules) and four drivers (strategies, IT solutions, cross-functional integration, and supplier management) within the model. Nevertheless, for the sake of clarity, this chapter provides a snapshot of the literature on the given factors of the purchasing environment.

2.1. Requestors, suppliers, and regulations/rules as forces of procurement

Literature distinguishes actors and groups that could change/influence certain purchasing activities through pressures and incentives set by them (Seuring & Müller, 2008). Gelderman et al. (2017) emphasized that stakeholder pressures are driving forces toward the implementation of standards and codes of conduct. Based on the nature of purchasing activities, procurement organization is the intersection point of stakeholders belonging to suppliers and co-departments. Articles connected to suppliers accentuate their crucial role and their enforcing power (Ogunranti et al., 2021; Padgett et al., 2020; Gelderman et al., 2017; Gelderman & Semeijn, 2006; Gelderman & Van Weele, 2005). Besides suppliers, internal requestors (co-departments) are those actors whose existence as forces is proven due to their roles. They are the so-called BUFUs (business units and functional units, such as manufacturing, marketing, quality, R&D departments etc) that launch purchase requests (requisitions) towards procurement (Gebauer & Shaw, 2004).

In addition to these two actors, legal aspects are to be considered as forces because purchasing risks can be mitigated by the established legal requirements involved/stipulated in the processes and contracts in terms of external rules and internal regulations (Venter, 2007; Wittinger, 2022). Seuring and Müller (2008) also mentioned the government as forces. Nevertheless, as the 4F4D model suggests, the government should be substituted by external rules because this comprises a much larger population of local, domestic, and global authorities. If purchasing organization applies rules and follows established procedures (as features of the so-called formalization) this positively impacts purchasing performance (Akin Ateş et al., 2018).

2.2. Strategies: companies' and functional (purchasing) ones

Strategies describe how companies intend to create value for their stakeholders (Robert S Kaplan & Norton, 2006), while functional strategies, as individual policies, must fit into the integrated pattern, and they will be deemed how they relate to other company's policies (Tilles, 1963). Thus, the purchasing

strategy must be in line with and an interrelated part of the company's strategies, as collaborative purchasing strategies enhance project efficiency (Eriksson et al., 2019).

This does not automatically lead to acceptance of purchasing strategy by co-organizations or management. Even though purchasing activities have a cumulative impact on corporate goals, procurement department must be regarded as acting legitimately, and whose procedures are desirable and appropriate (Suchman, 1995). Thus, legitimation means how accepted a given organization is inside its range of interpretation – a particular team or company (Acquah et al., 2021). The internal legitimacy level of procurement corresponds to how significant its contribution is compared to the whole performance. The key factor for the improvement of a purchasing organization's acceptance is the alignment of its objectives/strategies to the other functional or company's ones (Tchokogué et al., 2017).

2.3. Cross-functional integration: the internal cooperation of the company

Cross-functional integration is the cooperation among various divisions/functions of a company (Foerstl et al., 2013; Poberschnigg et al., 2020), in this case between procurement and requestors. Nevertheless, cooperation with requestors could lead to games inside the company where the outcome will depend on the power distribution among the involved actors (Bjerregaard & Jonasson, 2014; Perner & Skjølvik, 2016). Due to significant changes in operations, cross-functional integration and the involvement of cross-functional teams in projects become mandatory to increase purchasing performance (Ferreira et al., 2019). Cross-functional team members integrate diverse perspectives and synthesize various knowledge and competencies (e.g. technology, production, and procurement knowledge), thus, purchasing procedures can be better adjustable to the requirements and goals become much more achievable (Meschnig & Kaufmann, 2015). Procurement will contribute to the future success if interrelated organizations cooperate with purchasing because business success and competitive advantage can be gained by working together (Servajean-Hilst & Calvi, 2018).

However, still now, working and thinking together often results in failed cooperation. One barrier to internal knowledge transfer is occurring disagreement between the source (e.g. requestor) and recipient (e.g. procurement) (Szulanski, 1996). According to practice and in line with several articles, the inimical behaviour of organizations seems to survive the organizations' evolution in other sense (e.g. Goold et al., 1998; Porter, 1985; Ferreira et al., 2019). Porter blamed both the source and recipient; saying that the source has no incentive to transfer any know-how, especially if it time consuming or risks leaking out of proprietary technology, also the recipient is rarely open to finding know-how elsewhere in the company (Porter, 1985). Other viewpoints are that it is difficult to make business units agree to pursue an interrelationship (Goold et al., 1998) and it is just a hope that one business unit could learn something useful from another (Porter, 1985). These points of view are still experienced today (as in Ellegaard & Koch, 2014 and Brandon-Jones & Knoppen, 2018), however, nowadays companies are recognizing the importance of cross-functional integration and are engaging in applying cooperation at different integration levels (Barki & Pinsonneault, 2005).

2.4. Supplier management: the management of the external relationships

Considering that reactive planning was long time ago replaced by proactive planning (Carter et al., 2000; Kraljic, 1983), and now the emphasis is placed on risk management, therefore, procurement should consider the changes in supplier relationships management as well (Hallikas et al., 2020; Ogunranti et al., 2021). While in the past procurement managers focused mainly on cost reduction, now they are placing more emphasis on the continuity and flexibility of supply, especially in case of systemic shocks, such as global pandemic circumstances (McEvoy & Ferri, 2020). Due to the urgent necessity to mitigate such supply-side risks, procurement organizations and professionals must have higher skills/competencies and use more developed tools in terms of purchasing and supply management (Schulze et al., 2019; Araujo et al., 2016). These tools help procurement gain insights into suppliers' practices and risks and support purchasing in defining clear strategies for various types/categories of sourcing. Therefore, the most complex part of purchasing work is supplier management (SM) (Hallikas et al., 2020; Handfield et al., 2009; Wittinger, 2019). Without effective supply chain relationships, the effort to manage the flow of materials

will be unsuccessful (Croom et al., 2000). Hence, the role/activities of purchasing have significantly increased in importance to build/maintain appropriate suppliers' relationships (Bendixen & Abratt, 2007; Cousins, 2002; Handfield et al., 2009). Procurement should purchase goods/services using efficient supply chains that can provide supplies not only at the lowest cost, best quality, and highest flexibility, but also in a socially and environmentally responsible manner (Seuring & Müller, 2008; Zimmer et al., 2016).

In summary, effective SM methods can ensure continuous supply as well as help lower the number of suppliers, thus supporting greener procurement. Considering that suppliers will be evaluated several times during cooperation (at the beginning of a new cooperation or periodically to control the task fulfilment), efficient evaluation will reveal dispensable suppliers to make purchasing sustainable (Pónusz et al., 2020).

2.5. IT solutions: digitized workflows and procedures

The phenomenon called I4.0 is gaining ground primarily through business process digitalization; however, this is not just about the spread of technology but also about a complete paradigm shift in business processes (Tarigan et al., 2020). Therefore, for purchasing – considering the vulnerable supply channels of globalised markets – a way to increase effectiveness is to accomplish purchasing tasks through digitalized procedures since IT and e-procurement solutions are fundamental means for each company (Afolabi et al., 2019; Chae et al., 2005; Nivetha, 2021; Ronchi et al., 2010). Procurement by using digitized solutions increases the effectiveness of activities since these solutions allow procurement to improve comprehensive purchasing intelligence, faster processes, accelerate decisions by better access to information, boost flexibility in working, and reduce costs (Garrett, 2017). These solutions also support instant reporting possibilities (procedure status, lead-time, purchasing volume, spending). Nevertheless, the adaptation of IT systems and applications triggers essential changes in both organizational and process architecture necessitating their (partly or totally) reorganization (Centobelli et al., 2014).

Therefore, connected to digitalization and the paradigm shift, it is worth mentioning DC theory (Dynamic Capabilities framework); it suggests that competitiveness (income generation) in rapid technological changes depends to a large extent on enhancing internal technological, organizational, and managerial processes. It focuses on the adaptation of an organization to the changing environment and analyzes how by this adaptation the company purposefully modifies its resource base (Tece et al., 2009; Demeter et al., 2021). For example, companies can introduce new or upgrade available IT systems since these become key drivers of cooperation in supply chains (van Lith et al., 2015). To use adequate notions of digitalization, however, requires a mutual understanding of what the term digital technologies mean. The most often used terms are: BigData technologies, IoT and IoS (Internet of Things and Services), cloud and mobile technologies, social media applications, additive manufacturing, virtual reality, cognitive technology and more (Kane et al., 2016; Srari & Lorentz, 2019).

3. Description of the 4F4D model and interpretation of its factors

The 4F4D model, as outlined in Wittinger (2022), was developed based on insights from literature and practical experience. However, this initial study presented the framework conceptually without any validation, leaving it as a theoretical model. The present research aims to validate this model. For clarity, this section offers a brief overview of the model and its factors (Figure 1). The model's purpose is to provide a clear depiction of real-life purchasing processes and their components, utilizing a concise set of elements that can be standardized due to their similarities. Consequently, the model comprises two main groups: forces (requestors, suppliers, internal regulations, and external rules) representing key actors/stakeholders in purchasing procedures/contracts, and drivers (strategies, IT solutions, cross-functional integration, and supplier management) representing concepts, mechanisms/procedures, and platforms that connect these actors/stakeholders.

The model is divided into two parts: an internal (left side) and an external (right side) part. This division broadly reflects the distinction between elements that are within the organization's control and those that are more influenced by external factors. Considering that the model is designed to standardise the procurement procedure, it aims to capture (as a checklist) all relevant aspects that impact

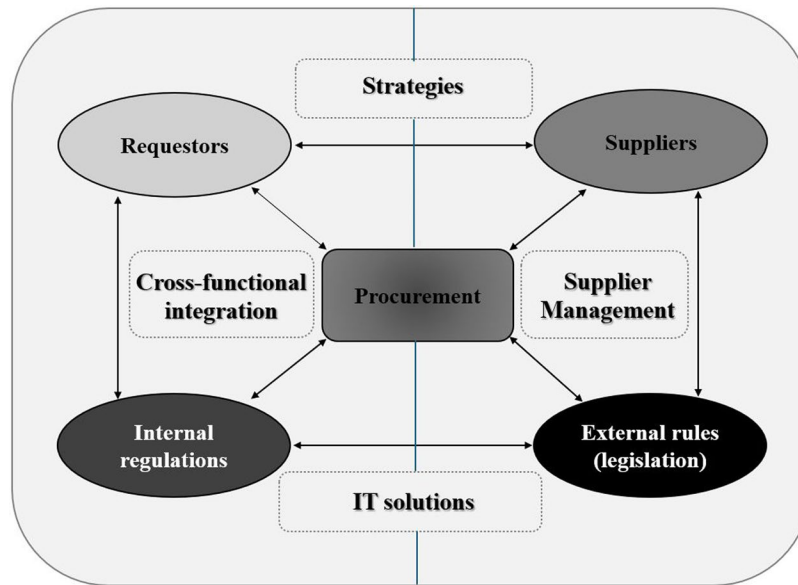


Figure 1. Four Forces and Four Drivers (4F4D) model (Source: Wittinger,2022).

procurement, providing a balanced representation of this environment, its components, and interactions. The next section includes the interpretation of the factors and their characteristics that help classify the elements into two groups. (See [Appendix B](#)).

3.1. Forces

Based on the pattern of procurement procedures, the key actors in activities at the purchasing level, as noted by Miemczyk et al. (2012), are the focal firms (represented by the internal requestors) and their suppliers. In this context, the term 'market' exclusively refers to suppliers for purchasing, as procurement professionals in multinational companies (matrix organizations with strong segmented areas of operation) do not have insights into the sales part of the market. As these roles are permanent in the processes, and the presence of these actors is mandatory to initiate a purchasing act, these factors are identified as forces.

To ensure processes, manage uncertainty and risks, and evolve supply networks, there is a need to engage with other institutional actors using appropriate regulations (MacCarthy et al., 2016). Considering that procurement is responsible for ensuring effective purchasing through legal clauses of the contracts in place to warrant the continuous fulfilment of suppliers (Changalima et al., 2022), therefore, we supplemented the forces with the legal environment (both external and internal). It should be considered as an actor embodied by the clauses formulated in the contract. As such, its role as a force is justified by the necessity to protect supply operations against defective performance, breach of contract, faults in fulfilment, etc.

Forces represent factors that exert restraining influences on procurement activities, including market characteristics (suppliers), internal demands (requestors), and regulatory factors (internal and external rules). They can enforce/impose certain behaviour in terms of how to act or what kinds of terms to incorporate into a contract. Furthermore, purchasing organizations cannot influence their existence, these factors being constant roles in operations (necessary ingredients of any purchasing activity), therefore they cannot be excluded from the procedures under any circumstances since the pattern of activity determines its actors/roles. This does not mean that an actor (e.g. a particular supplier) cannot be replaced, but the role remains a constant part of the operations that cannot be omitted. Apart from them, there are no other essential elements in the process. Furthermore, there is an inseparable connection (according to the literature and practice) between actors and rules (MacCarthy et al., 2016).

3.2. Drivers

Drivers are frameworks providing a background for purchasing work by interconnecting actors both internally and externally. They are not forces (neither actors nor stakeholders), they drive procurement procedures only and can be omitted from the purchasing procedures in extreme situations. For example, if IT systems collapse overnight, procurement must continue its activity because otherwise manufacturing and sales would not be. Before the spread of IT systems and platforms procurement procedures run. Similarly, strategies could be a missing part, especially if we regard 'strategies' as guiding concepts rather than their implementation (when they become internal rules). Strategies (like IT) did not exist in their current interpretation, but procurement processes operated. These features indicate that they are just platforms or concepts (however helpful for procurement), therefore, they are drivers.

Supplier management and cross-functional integration are even clearer; these are also concepts, processes/systems, and workflows that support cooperation and relationship management. Unfortunately, these elements (systems/approaches) still do not exist in many companies, or their application is at a very introductory stage, especially in SMEs (small-to-medium enterprises) as mentioned in Bianchini et al. (2019). In summary, drivers lead procurement processes and influence their operation and management because procurement procedures are driven by workflows, according to specific strategies, and rest on certain IT systems and applications (Wittinger, 2022). However, these factors may be missing from the operations.

4. Comparison of the 4F4D model to literature

This study aims to examine and demonstrate the validity (in terms of completeness and correctness) of the 4F4D model. Recognizing the gaps in the validation of purchasing models or concepts through literature review methods, this review approaches the subject from the perspective of the 4F4D model. Given that no studies have developed models or concepts from identical elements, the extent of related literature on these discussed elements cannot be processed in a single article with a different focus. Therefore, this chapter gives a brief review of papers deemed to be most relevant to the model, emphasizing their similarities with the 4F4D model in arrangement or concept, or the presence of elements with similar characteristics. Nevertheless, this comparison aims to highlight the main differences between the literature and the 4F4D model (Figure 2), while the emphasis is placed on structures and factors.

While many studies have initiated the analysis of purchasing processes from the point of issuing a purchase request (requisition) by the internal co-department, as observed in Gebauer and Shaw (2004), Ellegaard and Koch (2014), and Venter (2007), others have omitted the presentation of procurement activities from the very beginning. In other words, they do not start from requestors who demand purchasing services launching the procedure. Even in the study by Versendaal et al. (2013), which provides a detailed examination of purchasing processes, the analysis starts from purchasing placing orders, and they do not portray the preparatory phase of all purchasing activities in terms of requestors and purchase requisition. Similar patterns are found in other studies; although Bals et al. (2018) and Nicoletti (2017) analyze various internal factors of the company related to purchasing activities, they do not specify requestors and their requisition processes. Gelderman et al. (2017) identify actors influencing procurement; but they appear to not recognize requestors as those actors embodying the purchasing requirements.

Similarly, Mikalef et al. (2015) examined how purchasing strategy can be effectively aligned with IT and what conditions facilitate this state, arguing that purchasing alignment is dependent upon patterns of multiple contingencies. However, several elements (such as strategic orientation) cannot be comprehended within this range of interpretation if requestors are not connected at all to purchasing. The authors did not mention the participation ratio of different company sizes; presumably, the majority should not belong to the large company size. Because in the case of a large/multinational company, the procurement department is not aware of the sales strategy orientation the operations being strongly segmented.

In other studies, not only the requestor but also the purchasing organization (specified separately) is a missing part of the process descriptions. However, procurement departments should be the focal point

APPEARANCE IN THE LITERATURE OF THE SET OF FACTORS OF THE 4F4D PURCHASING MODEL	Four Forces				Four Drivers				CONCEPT OF THE STUDY/MODEL
	Requestors	Suppliers	Internal regulations	External rules	Strategies	Cross-functional integration	Supplier Management	IT solutions	
Bals et al. (2018)									Depicts a contingency model for structural alternatives along internal and external factors
Barki and Pinsonneault (2005)									Model of organizational integration, relationship analyse between implementation and performance
Bensaou (1999)									Describes portfolios of buyer-supplier relationships based on the Kraljic-matrix
Bianchini et al. (2019)									Model of classification of suppliers (based on Kraljic-matrix) for lead-time reduction
Brandon-Jones and Knoppen (2018)									Impact of two sequential dimensions of strategic purchasing (recognition and involvement) on DC development
Cousins (2002)									Conceptual model of inter-organisational relationships with internal and external aspects
De Boer et al. (2002)									Model of impact (direct and indirect) of electronic procurement on purchasing (-related) costs
Den Butter and Linse (2008)									Examination of linkage between procurement and strategic decisions by hard and soft factors
Ellegaard and Koch (2014)									Model of functional integration and conflict between production and purchasing
Fatorachian-Kazemi (2020)									Researches the application of I.4.0-enabling IT-technologies that bring significant performance improvements in SCM
Gelderman et al. (2017)									Model of sustainability by analyses of relations among actors, factors, and implementation
Gebauer-Shaw (2004)									The study assesses the success factors and impacts of mobile e-procurement applications
Hesping and Schiele (2015)									Analysis of development in purchasing strategies by integrated sourcing categories and levels
Kang et al. (2018)									Alignment of purchasing portfolio management with the sourcing negotiation styles
Kleindorfer et al. (2005)									Sustainable operations management examining sustainability and the extended supply chain
Kraljic (1983)									How to manage purchasing by classifying and analysing the portfolio of supply
Li and Nagurney (2015)									Description of multi-tiered supply chain network model of competition between firms and suppliers
Mikalef et al. (2015)									Examine how purchasing strategy can be effectively aligned with IT and what conditions facilitate this state
Nicoletti (2017)									Elaboration of models related to purchasing work, IT and costs, supplier and contract management
Rezaei and Fallah Lajimi (2019)									Segmentation of supplies with the help of purchasing portfolio and supplier potential matrix
Rozemeijer et al. (2003)									Contingency model of how to create corporate advantage through purchasing performance
Saccani and Perona (2007)									Contingency model for shaping and managing buyer-supplier relationships
Seuring and Müller (2008)									Conceptual framework of sustainable supply chain management by several dimensions
Venter (2007)									Development of a three-dimensional procurement fraud risk matrix
Versendaal et al (2013)									Analyze procurement maturity and IT-alignment as a key to organizational performance

Figure 2. Appearance of the set of factors (Authors' construction).

of the supply chain (Blanchard, 2010). Thus, even though the examinations focus on procurement procedures, it appears that they are either not directly involved or are not analyzed at their relevant level. In summary, it is not possible to adequately describe the supply chain and the relationship between suppliers and manufacturing when purchasing is omitted, as observed in Kleindorfer et al. (2005) and Seuring and Müller (2008), or only superficially mentioned as in Fatorachian and Kazemi (2020). They researched the application of I.4.0-enabling IT technologies. Despite portraying supply chain specifics in a holistic manner, purchasing, as a whole (i.e. organization) was not considered in its own range of interpretation.

The significance of procurement and its strategy is emphasized by its critical role as 'the first step in the value chain' (Çankaya & Sezen, 2019, p. 100), leading to the legitimization of its function, operations,

and strategies (Acquah et al., 2021). This should serve as a guiding principle for companies that may sometimes overlook the role of procurement in value creation and achieving better supply chain performance (Bianchi et al., 2019; Patrucco et al., 2019; Rane et al., 2020). Studies like Hespings and Schiele (2015) transparently depict the complex nature of purchasing strategies. However, this study does not clearly distinguish between the development of strategies (as concepts or the preparatory phase of regulations) and their mandatory implementation (when they become regulations), as suggested by Morris and Jamieson (2005). In addition, even though this study was elaborated to analyze the development of purchasing strategies (defining five levels), nevertheless, it seems that an overlap or a misunderstanding might be recognized among these levels in comparison with the practice. The lowest strategy level in terms of work segmentation generally is category management. The task of categories is to differentiate sourcing groups and their particularities and, thus, to allow and support distinctive approaches. If we consider that various procurement groups exist (such as raw materials, maintenance and spare parts of production in direct procurement, or IT, finance and HR services, fleet and facility management in indirect procurement), related purchasing requirements are managed based on category management that requires distinctive know-how/knowledge. In contrast, supplier strategies (as the way to handle an individual supplier) and sourcing levers (as tactics used, such as price/cost evaluations) are rather tools of supplier management. Several purchasing categories could apply the same supplier management tools while one purchasing category could use multiple supplier management methods. In summary, distinction, in terms of strategy, is to be made based on knowledge that could be unique and differ from one purchase category to another, while SM methods are not unique ones linked to these categories (as seen in Heikkilä et al., 2018).

Regarding internal and external rules, despite their protective role in supply and their enforcing power in contracts, in some studies, their representation is lacking, even in those that discuss other elements of purchasing in detail, such as the IT aspects by De Boer et al. (2002) although IT processes must be aligned with internal regulations (i.e. approval levels and their order). In the study of Bals et al. (2018), they depict a contingency model for structural alternatives, defining macro-level dimensions of the purchasing organization/work. They also identified external and internal parts and enumerated several factors and dimensions. Although multiple dimensions have been considered, the total lack of regulations and rules can be observed; however, the interconnection between certain actors cannot be interpreted without these segments because there is a great accent on legal compliance during the purchasing processes, since this prudence will protect the supply and mitigate the risks.

Barki and Pinsonneault (2005) constructed a model of organizational integration that analyzes the relationship between implementation and performance. However, they also did not consider at all either internal or external rules, although the inter- or intra-connections among different organizations should be led by regulations/rules. Similarly, Gebauer and Shaw (2004) assessed the success factors and impacts of mobile e-procurement applications. They initiated the analysis of purchasing processes from issuing a purchase request (requisition) by the internal co-department. Like the 4F4D model, this study builds up interconnection (a correlation) among the requester (requestor), buyer (procurement), and supplier. Nevertheless, they did not mention and analyze the role and importance of internal and external rules; however, all purchasing workflows are driven and set up based on the connected regulations (e.g. RACI matrix, a chart of Responsible-Accountable-Consulted-Informed roles). Other studies, such as Den Butter and Linse (2008) and Venter (2007), incorporated aspects of regulations, especially in the realm of risk management.

The most extensive literature addresses suppliers, acknowledging their immutable role in procedures, placing a high emphasis primarily on supplier management because of its increased importance arising from higher risk factors and the need for continuity and flexibility (Ogunranti et al., 2021; Padgett et al., 2020; McEvoy & Ferri, 2020; Hallikas et al., 2020; Wittinger, 2019; Handfield et al., 2009). In this context, articles related to SM deeply discuss terms such as the evaluation and selection of suppliers, risk management, and more, as seen for example in Kraljic, 1983 (the first published matrix), and several other studies that built on this model, such as Bianchini et al. (2019), Rezaei and Fallah Lajimi (2019), Kang et al. (2018), Bensaou (1999), Sacconi and Perona (2007), Hespings and Schiele (2016), Ateş et al. (2015), Perdana and Mulyono (2021), and many others. The (original) matrix of Kraljic (1983) is one of the few models that are nowadays used as well (even though old but still valid) because it fits today's real-life

purchasing processes. Bianchini et al. (2019) developed a classification model of suppliers for lead-time reduction. Bensaou (1999) also examined the portfolios of buyer-supplier relationships based on the Kraljic matrix. Kang et al. (2018) discussed the alignment of purchasing portfolio management with the sourcing negotiation styles. Saccani and Perona (2007) and Rezaei and Fallah Lajimi (2019) discussed and catalogued the buyer-supplier relationship and cooperation. Rezaei and Fallah Lajimi (2019) developed the segmentation of supplies with the help of purchasing portfolio and supplier potential matrix, while Saccani and Perona (2007) developed a contingency model for shaping and managing buyer-supplier relationships. However, all these studies depict how to manage purchasing by classifying and analysing the supply portfolio from several aspects, thus, they all strongly focus primarily on suppliers and their aspects but do not deal in any depth with other aspects. This means that these studies lack a comprehensive view (in other terms) of such a complex environment as purchasing.

Strongly connected to supplier management, we must mention information technology (IT), considering that the SM system itself (especially in developed organizations) is an IT system that operates on IT platforms. Consequently, IT continues to revolutionize the purchasing environment, as these e-procurement solutions are vital for companies to reduce costs and process lead-time (Pattanayak & Punyatoya, 2020; R. Handfield et al., 2019; Garrett, 2017; Ronchi et al., 2010; Nivetha, 2021; Afolabi et al., 2019; Chae et al., 2005). Future transactions are increasingly based on digitized and automated procedures, transferring various value-creation processes to platforms because the requirement is to manufacture complex digital and interconnected system solutions (Veile et al., 2021). The effective management of a multitiered supply chain network, as depicted in Li and Nagurney (2015), cannot be achieved without IT and SM systems support, although this study does not shed light on these solutions. Furthermore, Rozemeijer et al. (2003) developed a contingency model of how to create corporate advantage through purchasing performance. They analyzed several dimensions of purchasing but did not put any accent on factors such as IT systems (or regulations and rules), however, these particularities interconnect actors of purchasing procedures and drive procurement processes and workflows.

The role of cross-functional integration, defined as cooperation among divisions/functions within a company (Poberschnigg et al., 2020; Foerstl et al., 2013), is crucial for enhancing purchasing performance, as purchasing procedures become adjusted to requirements and, therefore, requirements turn into achievable goals (Meschnig & Kaufmann, 2015). However, poor cooperation and internal politics within a company can hinder its effectiveness (Bjerregaard & Jonasson, 2014; Ferreira et al., 2019; Perner & Skjølsvik, 2016). As depicted, cross-functional integration contributes to the effectiveness of procedures; therefore, many studies consider this factor in their models and concepts (e.g. Barki & Pinsonneault, 2005; Bals et al., 2018; Ellegaard & Koch, 2014). However, some studies, such as Cousins (2002), dismiss this aspect even when examining operations from a stakeholder perspective. Another study related to this topic is Rozemeijer et al. (2003), although they examined the role of 'cooperation across units', they used the more general 'cross-functional' term only two or three times in the entire study. In summary, cross-functional integration/cooperation should be considered when depicting operations at the purchasing level as it interconnects requestors with the purchasing function.

Ellegaard and Koch (2014) elaborated a model of functional integration and conflict between production and purchasing. They studied in detail the conflicts and difficulties in cooperation between these functional areas and although they offered some alternatives for problem resolution, however, they did not reveal other opportunities used in the practice. One resolution applied is the cooperation between parties during tendering by forming a common evaluation committee for supplier evaluation (in terms of supplier management but using cross-functional integration). In this way, the parties will be forced to bear together the responsibility of supplier selection which will result in more cooperative willingness.

Brandon-Jones and Knoppen (2018) examined the impact of two sequential dimensions of strategic purchasing (recognition and involvement) on the development and deployment of dynamic capabilities. The authors argue that from a dynamic capabilities' perspective, purchasing recognition and subsequent purchasing involvement act as enablers of dynamic capability development by knowledge scanning. Although they put an accent on cross-functional integration, however, they did not mention and examine the knowledge scanning at the requestors (internal customers of procurement services) level. However, requestors must be most aware of the know-how behind purchasing requirements given that the professionals of BUFUs (co-organizations) are always responsible and accountable for technical

specifications of purchasing requisitions (even in the case of strong category management from procurement side).

In summary, even though the selected studies make valuable contributions to various aspects of procurement, the 4F4D model offers a more comprehensive and interconnected framework at the purchasing level. The 4F4D model's distinctive classification of factors as forces and drivers, coupled with its emphasis on interconnections, offers a holistic understanding of the procurement processes. Although insightful, the selected studies may not cover the entire spectrum of factors encapsulated in the 4F4D model.

Alternatively, some studies evaluate operations from a much broader perspective (such as the supply chain), without specifically addressing activities at the purchasing level. Thus, this review underscores the novel and comprehensive nature of the model in the procurement landscape.

5. Research: questions and hypotheses, methodology and data collection

The research was motivated by the recognition of a gap among existing purchasing models. Despite the extensive literature and its deep review, researchers found no model that comprehensively describes the realm of procurement, depicting all activities at this level in a generalized manner. The entire research process (including the elaboration of the conceptual model and associated documents, data processing, and more), lasted from 2021 to 2023, while the interviews and survey were conducted between Q4 2021 and Q4 2022. Researchers followed a structured approach to concept construction, as illustrated in the research method diagram (Figure 3).

5.1. Research questions and hypotheses

Since Wittinger's (2022) study introduced the conceptual model of the 4F4D framework without validation, the aim of this article was to assess the model's validity through interviews and a survey. Consistent with Maier et al. (2012), the phase of developing a new or evaluating an existing model must be

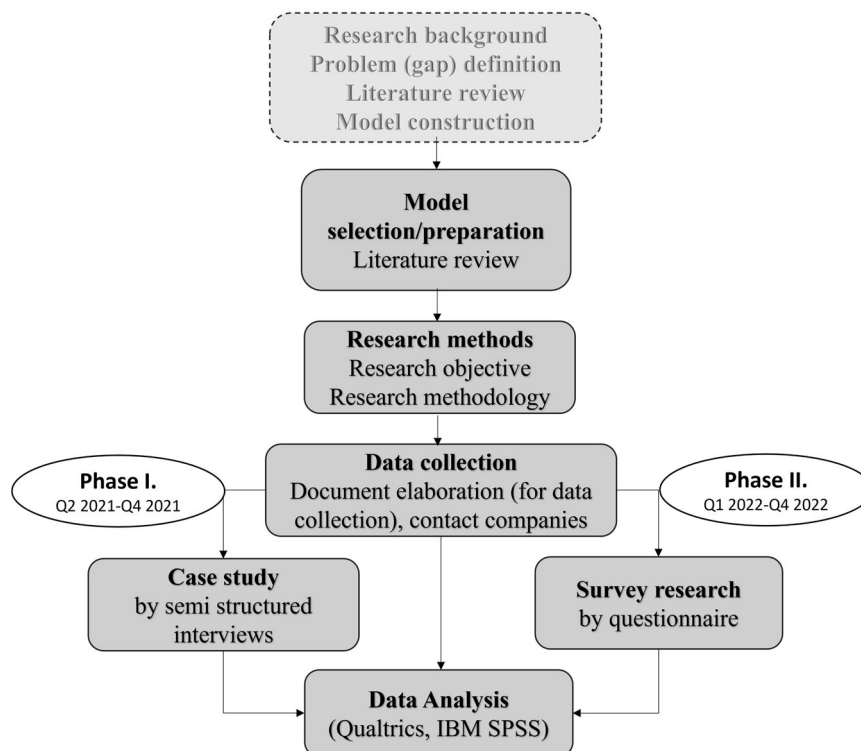


Figure 3. Research method diagram (Authors' construction).

followed by the phases of validation (to ensure alignment between the author's intent and the user's understanding) and verification (ensuring the correctness of the results).

To guide this validation process, researchers formulated research questions (RQs) and hypotheses as follows:

Research questions	Hypotheses
RQ1: To what extent do the model elements influence procurement processes? Are all factors necessary in the purchasing procedure and is the importance of each factor considered at the same level?	Hypothesis: Each factor of the model is of high importance in purchasing work.
RQ2: Do respondents have any suggestions regarding new parts or elements of the model to be added? Are there missing parts from the current model that are necessary for carrying out purchasing processes, so is the model complete?	Hypothesis: There are no further relevant factors in purchasing activities, therefore the model is complete and comprehensive.
RQ3: Do the respondents correctly group the given factors into two categories (forces and drivers) as the model suggests? Are the elements of the model properly grouped into two different categories indicating the correctness of the model?	Hypothesis: The factors of the model are appropriately classified into the two groups, as the group of forces and drivers are clearly different from each other.

5.2. Research methodology

Researchers employed both qualitative (case study) and quantitative (survey) methodologies as suggested by Sjoerdsma and Van Weele (2015), Foerstl et al. (2013), and Kothari et al. (2005). The decision to combine these methods was driven by two reasons. First, using a multi-method mixture minimizes the disadvantages of either approach while benefiting from the constructive nature of qualitative methodology and the analytical potential of quantitative methodology. Therefore, the use of multiple methodologies strengthens the robustness of the results (Huber et al., 2005). Second, researchers aimed to test the model at both executive and associate levels. Usage of these two approaches provides real insights with arguments, while also covering a larger population, making the results more accurate. The differentiation between the methods used for executives and associates aims to ensure a thorough investigation of the model from multiple angles within procurement organizations.

In qualitative research researchers adopted a multiple-case study approach following Yin's (2012) methodology. In addition, after examining the cases individually, researchers applied a cross-case synthesis method. The sampling strategy was theory-based, aiming to identify a sample that best aligns with the theory under examination. Therefore, the authors selected leading companies within their respective industries, expecting well-established procurement organizations where purchasing procedures rest on integrated regulations and practice-based workflows exist because large firms are more complex in terms of organizational structures (Foerstl et al., 2013). Additionally, comprehensive concepts and models are not extensively utilized in small and medium-sized enterprises (SMEs) due to a lack of knowledge, awareness about their positive impact on the organization, and resource limitations (Bianchini et al., 2019).

In terms of quantitative methodology survey research was applied. The questions formulated in the questionnaire were directly related to the components (factors) of the model. The questionnaire comprised both closed-ended questions and Likert-type 1-5 scales aimed at standardizing responses for consistent interpretation and facilitating analysis, as recommended by Somekh and Lewin (2005). Additionally, one open-ended question was included to allow respondents to provide independent opinions on the model, offering the opportunity to suggest potential additional components.

5.3. Characteristics of research

The five selected companies are large, multinational corporations with a global presence across multiple countries in Europe and worldwide. They operate in key sectors of the economy, namely, in the chemical-pharmaceutical, energy, and transportation-logistics industries. Each of these companies has a matrix organizational structure characterized by multiple and complex reporting levels, as well as cross-functional integration/cooperation, and advanced supplier management practices. Due to their advanced business processes, companies efficiently implement best practices, conduct operations based on benchmarking, and apply common standards of business management. The purchasing organizations within these companies are positioned at the third level (where the CEO is at the first level). Furthermore,

procurement leaders in these organizations are highly qualified professionals with outstanding work experience. Figure 4 shows the key figures regarding companies.

Researchers conducted in-depth interviews with purchasing leaders at the selected five multinational/large companies. The opinion of the top-executives of the purchasing organization holds significant weight, as 'top managers certainly influence the values and strategy of their organizations and as stakeholders should have the most influence on sustainable supply chain management decisions' (Meixell & Luoma, 2015, p. 84). Studies indicate that leaders' support is one of the most powerful components of how employees perceive the department's support and guidelines (Amin et al., 2021).

The respondents of the survey were the subordinates of the interviewed purchasing leaders as such working at the given five companies inside the procurement organization led by the interviewees. All of them are purchasing professionals, 80% of whom had over 5 or 10 years of work experience. Given their considerable expertise, it can be reasonably assumed that they were well-equipped to provide appropriate judgments regarding survey questions related to the structure and components (factors) of the model. Figure 5 illustrates the distribution of work experience among the survey respondents.

5.4. Data collection

For data collection (features in Figure 6) researchers applied semi-structured in-depth interviews (Appendix A) and survey research questionnaire (Appendix B). The interviews were structured into separate parts: one part encompassed general inquiries about the interviewee, including details such as job position, its starting date, length of the purchasing practice, and similar aspects; and questions about the company and the organizational unit were covered, encompassing factors such as FTE count of the company and department, the level of the purchasing organization, its budget, number of suppliers and contracts, and more. This section also involved questions about both strengths and weaknesses as well as factors influencing or impacting purchasing work. In the second part of the interview, researchers revealed the 4F4D

Participant companies	Company A	Company B	Company C	Company D	Company E
Type of company	large/ multinational	large/ multinational	large/ multinational	large	large/ multinational
Industry	energy	energy	chemical- pharmaceutical	transportation- logistics	energy
Company employees no. (E) (FTEs on group level)	E > 15000 FTE	E > 15000 FTE	10000 < E < 15000 FTE	E > 15000 FTE	E > 15000 FTE
Procurement employees no. (E) (FTEs integrated number)	E > 250 FTE	E > 250 FTE	100 < E < 250 FTE	E < 100 FTE	E > 250 FTE
Procurement budget (B) (domestic - million EUR)	B > 500 M EUR	B > 500 M EUR	250 < B < 500 M EUR	250 < B < 500 M EUR	B > 500 M EUR
Average no. of new contracts (C) (pcs/year)	100 < C < 500 pcs/y	C > 500 pcs/y	C > 500 pcs/y	C > 500 pcs/y	C > 500 pcs/y
Average no. of suppliers (S) (pcs in force)	S > 10000 pcs	S > 10000 pcs	S < 5000 pcs	S < 5000 pcs	S < 5000 pcs
Level of Proc. Dep. (CEO is the 1st level)	3rd	3rd	3rd	3rd	3rd
Procurement experience of interviewee (years)	20 years	16 years	20 years	12 years	21 years
Interviewee's job position	Procurement Director	Chief Proc. Officer	Head of Procurement	Procurement Director	Head of Procurement

Figure 4. Key figures of companies (Authors' construction).



Figure 5. Work experience of respondents (Authors' construction).

Data collection / Participants	Company A	Company B	Company C	Company D	Company E
INTERVIEWS					
Date of interviews	28-Oct-2021	29-Oct-2021	3-Nov-2021	16-Nov-2021	16-Dec-2021
Data collection	audio recorded	audio recorded	audio recorded	audio recorded	audio recorded
Duration in time (hh:mm:ss)	01:35:20	01:38:13	01:15:05	01:41:07	00:32:05
Size (MB)	46,50 MB	48,20 MB	37,70 MB	49,50 MB	15,30 MB
Statement	signed	signed	signed	signed	signed
Consent to disclosure	No	No	No	No	No
SURVEY					
Date of completion	Nov-Dec 2022	Nov-Dec 2022	Nov-Dec 2022	Nov-Dec 2022	Nov-Dec 2022
Data collection	questionnaire	questionnaire	questionnaire	questionnaire	questionnaire
Type of data collection	anonymous	anonymous	anonymous	anonymous	anonymous
Survey respondents (FTE) (without 4 FTEs, where no data)	32	17	49	10	16

Figure 6. Data collection (Authors' construction).

model and sought respondents' opinions on various aspects, including its structure (arrangement) and factors (in terms of completeness and correctness) as well as the model's validity and applicability in practice.

The length of interviews was 80 minutes (on average), all were audio-recorded, and detailed notes were taken. The consent statements regarding data processing were collected from all participants in written form. All of them restricted the data access allowing anonymous usage only. The interviews were complemented by direct, personal observations made during the interviews and the processing of additional information such as figures provided by the interviewees and publicly available data.

Prior to the launch of the survey, the questionnaire was tested by three professionals with extensive purchasing experience working at multinational companies. Their feedback indicated that no modifications were necessary, and they confirmed the absence of unclear questions or sections in the survey. After the pilot survey, respondents were invited to complete the questionnaire on online platform. Data analysis was conducted on the Qualtrics platform and using IBM SPSS. The survey gathered anonymous responses from 128 purchasing professionals without the use of personal data.

The model's factors, along with the meanings of the forces and drivers, were comprehensively explained in the survey. In addition, definitions and interpretations were provided before related questions were presented. Respondents were explicitly advised to carefully read these definitions to ensure a uniform interpretation, which was essential for the accurate and professional completion of the questionnaire. Researchers included only professional questions (three connected to the model and two connected to the practice in terms of experience and company affiliation) to determine the necessity and extent of each factor in the purchasing processes. In addition, researchers sought insights into whether there were any potential additions to the model to enhance its completeness. Furthermore, they aimed to analyze the classification of the factors into groups of forces and drivers.

6. Findings

6.1. Case analysis

The detailed analysis of the case studies is presented in Wittinger et al. (2023). Here, researchers focus only on results related to the correctness and completeness of the model. They identified the following factors influencing the purchasing work mentioned by the participants during the interviews. Researchers comprehended and synthesized the interviewees' responses in Figure 7.

- Each leader directly identified the requestor (the internal organization issuing the purchasing request and demanding purchasing services) and the supplier as 'players' in the purchasing processes.
- All of them mentioned IT solutions in some form, such as IT systems, digital platforms, IT applications, digital solutions, IT-, electronic- or digital workflows, etc., allowing us to identify the 'IT solutions' factor.
- All leaders mentioned internal regulations, such as financial, tax, treasury, legal, HR, etc., to be inserted into the concluded contracts.
- Some leaders remembered, while others forgot to mention separately (by themselves), factors such as external rules, strategies, cross-functional integration, and supplier management. However, most of them accentuated during the interviews the weight of government, external law or legislation (involved in the external rules), or the importance of the company's or procurement strategy (as strategies). Furthermore, when depicting daily work and problems during purchasing procedures, they all emphasized the significance of cross-functional integration/cooperation and supplier management.

ANALYSIS OF INTERVIEW DATA (mentioned elements yes=1, no=0)	Factors specified/mentioned by interviewees							
	Four Forces				Four Drivers			
	Requestor	Supplier	Internal regulation	External rules	Strategies	Cross-functional integration	Supplier Management	IT solutions
Company A	1	1	1	1	0	0	0	1
Company B	1	1	1	1	1	0	1	1
Company C	1	1	1	1	1	1	0	1
Company D	1	1	1	0	1	1	1	1
Company E	1	1	1	0	0	1	1	1
No. of opinion coincidence	5	5	5	3	3	3	3	5

Figure 7. Elements mentioned by interviewees (Authors' construction).

After collecting answers about the influencing factors, researchers revealed the applied model to the interviewees. They inquired whether the model changed their opinion regarding the purchasing environment, its factors, and their interactions. Additionally, researchers inquired if they had any suggestions regarding the present structure, whether something was missing or if any part was redundant/unnecessary in the model.

When the model was revealed, some leaders expressed regret that they did not mention some parts themselves. Each leader confirmed that the model is comprehensive and complete, acknowledging that these are the factors (parts) of procurement work, and that this structure accurately depicts the purchasing processes. Only one leader suggested mentioning the 'market' separately. However, researchers consider that this is already involved in the model, as it is completely represented by the suppliers. Apart from this view, they did not have any suggestions for adding or deleting parts. They welcomed the model, expressing satisfaction with its construction, considering it useful and applicable, and confirming the lack of an applicable tool in purchasing management in practice. They also expressed readiness to use it during their activities. Some opinions expressed by purchasing executives during the interviews: Company A: 'This model includes all that we can say and note about purchasing work'. Company C: 'I just regret that I am not the one who figured out this model!'

6.2. Survey results

This section outlines the analysis of survey data. In RQ1, researchers asked survey participants to indicate the extent to which the given elements influenced the procurement processes. In RQ2, they inquired about missing factors, if any, to analyze the completeness of the model. Furthermore, researchers investigated how the respondents categorized the factors as forces and drivers (RQ3) and searched for deeper relationships among the factors through cluster analysis. Lastly, they tested the neutrality of the model in terms of the working experience and affiliation of the respondents.

Figure 8 shows the responses to RQ1. Two factors, internal regulations and external rules, achieved the highest percentage of selection in the 'completely' category, underscoring the mandatory nature and crucial importance of the legal environment, both internally and externally, during procurement procedures. Furthermore, the factors requestors and suppliers gathered the highest percentage of choices in the absolute sense, reinforcing the classification of these four factors as forces in the model. In summary, each factor, based on the highest percentage of choices, was most often placed in the 'very' and 'completely' categories by respondents, confirming the hypothesis that all the listed factors are considered as significant, as depicted in the established model. Nevertheless, factors IT solutions and supplier

Factors / Impact (highest rank highlighted)	Not at all	Slightly	Neutral	Very	Completely
Internal regulations (accounting-tax, finance, law, etc.)	0%	3%	6%	40%	51%
Requestors (internal customers)	0%	3%	10%	68%	19%
IT solutions (systems and applications)	1%	10%	30%	49%	9%
Cross-functional integration (cooperation among co-departments)	0%	9%	21%	53%	16%
External rules (legislation and rules)	0%	2%	16%	38%	45%
Suppliers (representatives of the market)	1%	5%	8%	59%	27%
Supplier Management (evaluation and selection of suppliers)	1%	9%	26%	49%	15%
Strategies (business principles)	0%	8%	23%	50%	20%

Figure 8. Impact of factors on processes (Authors' construction).

management received the lowest percentage of choices, although higher values and more pronounced importance were expected, especially in today's digital era.

To address RQ2, researchers posed one open-ended question to discover whether respondents had any opinion on supplementing the model with potential (new) parts. Only ten suggestions were received, and Figure 9 illustrates the gathered elements.

According to researchers' analysis, all the elements mentioned by the survey respondents (i.e. considered by them as missing parts) can be matched, without any exception, by the already existing factors of the model, respectively: suppliers, procurement, and cross-functional integration. Nevertheless, the answers reflect that the mentioned factors could have aspects to be rethought.

1. **Market (suppliers):** The market and its changes are represented by the suppliers and their current contractual conditions. Purchasing missing resources is exclusively executed through suppliers; therefore, suppliers embody the market from the purchasing point of view. They serve as the gateway for resources to enter purchasing organizations and facilitate manufacturing and sales in companies. Therefore, the 'suppliers' factor is synonymous with the market for procurement professionals; in addition, in the survey, the definition of suppliers was made accordingly.
2. **Procurement:** The purchasing organization is part (the heart) of the model. However, since the respondents did not see the entire model, they were unaware that procurement has already been integrated into the model.
3. **Cross-functional integration:** Notions mentioned by respondents, such as communication, cooperation among actors and organizations, and behaviours, all fall under cross-functional integration, which is already involved in the model.

The absence of any new element further strengthens the completeness of the model.

To address RQ3, the respondents were asked to categorize the factors into two groups: forces and drivers (as suggested by the 4F4D model). All factors (except strategies) were classified according to the model (based on the highest percentage of choices), supporting the validity of the model design

#	Answers (mentioned "missing" elements)	Factor matching
1	Procurement organization (maturity)	Procurement
2	Experience of purchasers in general (such as: MS Office, negotiation technique, market/industry knowledge, stakeholder management, based on career level), knowledge of buyers in the given company (internal processes, colleagues and internal stakeholders)	Procurement
3	Organizational communication, basic human skills (cooperation)	Cross-functional integration
4	Crisis situations - pandemic, war/embargo/energy crisis, natural disasters, political decisions, etc.	Suppliers (alias Market)
5	Inflation, share prices of commodities, war	Suppliers (alias Market)
6	"Habits" (in the bad sense); "abilities" of the actors; behaviour of actors that goes beyond internal and external regulations; market processes and effects	Cross-functional integration Suppliers (alias Market)
7	The existence of internal resources, i.e. the purchasing organization itself	Procurement
8	Time factor (how much time is available to conduct the procedure)	Procurement
9	Project schedules and preparation of annual plans for a uniform tendering of suppliers and to ensure supplier capacities. The market is finite, the supply capacity is finite, and the poorly timed, backlogged projects result in huge delays and additional financial burdens; these greatly influence procurement processes and create forced situations	Procurement Suppliers (alias Market)
10	Concurrency (how many requests are in progress at the same time)	Procurement

Figure 9. Mentioned 'missing' elements by survey respondents (Authors' construction).

Factors / Classification (highest rank highlighted)	FORCE It can enforce contractual terms	DRIVER It connects, drives, provides background and guides
Internal regulations (accounting-tax, finance, law, etc.)	63%	37%
Requestors (internal customers)	60%	40%
IT solutions (systems and applications)	14%	86%
Cross-functional integration (cooperation among co-departments)	23%	77%
External rules (legislation and rules)	78%	22%
Suppliers (representatives of the market)	70%	30%
Supplier Management (evaluation and selection of suppliers)	24%	76%
Strategies (business principles)	53%	47%

Figure 10. Classification of factors in two groups (*Authors' construction*).

(Figure 10). Even though strategies were placed in the forces group, the proximity between the two percentages (53% vs. 47%) indicates uncertainty among respondents regarding the classification of this element. This slight ambiguity around the strategies factor suggests that respondents may have had varying interpretations or considerations regarding its classification. Nevertheless, this aligns with our assumption that the factors of the model are correctly classified into the stated forces and drivers groups.

In addition to the analysis of survey data for RQ3, Cluster Analysis (CA) was employed to further examine the relationships among the elements of the 4F4D model. Hierarchical Cluster Analysis (HCA) with Ward linkage was applied for this purpose, and the results are presented in Figure 11. The clustering process aims to group elements that are more closely related to each other based on the respondents' perceptions.

The Cluster Analysis results based on SPSS and the elaborated dendrogram indicate distinct groups among the factors of the 4F4D model:

1. **Internal regulations** and **external rules**: These factors appear closely related and form a cohesive group. Strategies also showed a weaker connection to this group, possibly due to confusion between strategies and regulations (discussed in the next chapter).
2. **Requestors** and **suppliers**: Another well-defined group is formed by the factors of requestors and suppliers, indicating a strong connection between them.
3. **IT** and **supplier management**, and to a slightly lesser extent, **cross-functional integration**: These factors constitute the third group, demonstrating similarities among them.

In summary, cluster analysis supports the original design of the 4F4D model, highlighting strong connections among its factors, with all factors (except strategies) belonging to their designated groups.

Researchers also applied Cross-tabulation analysis to provide insights into the relationship between the classification of elements (force or driver) and respondents' work experiences and workplaces; Figure 12 shows the findings by Chi-Square tests results on a 5% significance level:

1. **Cross-functional integration and work experience**: The data suggest a weak relationship between work experience and classification of cross-functional integration. Respondents with more than ten years of experience classified cross-functional integration more often as a driver, indicating a potentially better awareness of the importance of cooperation and its impact on procurement processes. Of the 72 respondents, 61 classified cross-functional integration as driver and 11 as force.

2. **External rules and work experience:** Similar to cross-functional integration, there is a weak relationship between work experience and classification of external rules. Respondents with more than ten years of experience tended to classify external rules as a force, emphasizing the significance of legal aspects in procurement activities. Of the 72 respondents, 62 classified external rules as force and 10 as driver.

These results suggest that increased professional experience may contribute to a more accurate classification of certain factors (cross-functional integration and external rules) and potentially enhance the awareness of associated risks.

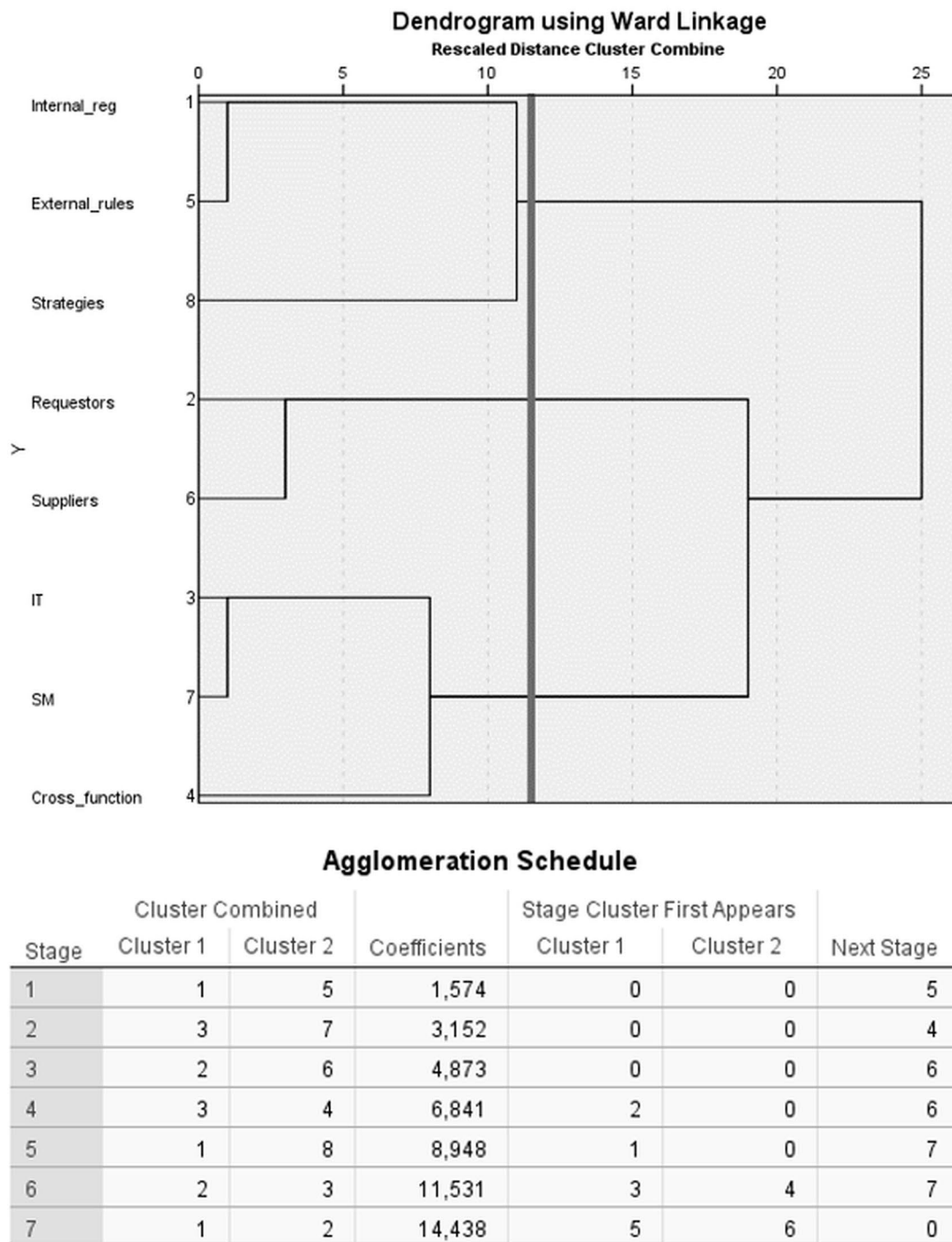


Figure 11. Cluster analysis of factors (Authors' construction).

Strength of connections (Chi-square p values) by Chi-square tests results on a 5% significance level (significant cells are highlighted)	Factors' classification (Force or Driver) and	
	Work experience	Company affiliation
Internal regulations (accounting-tax, finance, law, etc.)	0,613	0,123
Requestors (internal customers)	0,633	0,635
IT solutions (systems and applications)	0,659	0,809
Cross-functional integration (cooperation among co-departments)	0,032*	0,351
External rules (legislation and rules)	0,049*	0,765
Suppliers (representatives of the market)	0,359	0,418
Supplier Management (evaluation and selection of suppliers)	0,089	0,646
Strategies (business principles)	0,765	0,652

Figure 12. Strength of connections (Chi-square p values) (*Authors' construction*).

The analysis results indicate that there is no convincingly significant relationship between factors (forces and drivers) and respondents' work experience or company affiliation. Therefore, a general conclusion can be drawn that neither the company affiliation nor the work experience significantly influences the model's validity. This suggests that the 4F4D model's applicability and relevance appear to be consistent across different levels of professional experience and various company affiliations. The model's design, with its classification of factors into forces and drivers, seems to offer a consistent framework that procurement professionals find applicable and relevant irrespective of their specific work contexts.

7. Discussion of the results

This research verified the correctness, completeness, and usefulness of the model in terms of an adequate structure with elements that are desired and represented in the right place, as well as applicable in practice. The interviewees acknowledged the holistic nature and validity of the model, while the analyses of survey data also supported the hypothesis that the model had a correct shape and was complete in its design. Thus, the validity, correctness, and completeness of the 4F4D model were proven. Based on the analyses of the cases and data, the research questions were answered and the hypotheses were confirmed. Nevertheless, some minor discrepancies occurred between subordinates' and leaders' opinions or between subordinates' opinions and the constructed model, which are resolved in this chapter.

7.1. Comparing the interviews and survey RQ1

To identify any mismatch between the opinions of executives and subordinates regarding these factors, researchers compared the results. They looked at the factors mentioned in the interviews, and the factors ranked as having a high impact on work in the survey. They attempted to determine whether there were discrepancies (D) or coincidences (C) between these two approaches. They coded the answers with 1 or 0 as follows: for interviewees, if the number of answers that mentioned the same factors was equal to five, the code should be 1; in other cases, it is 0. For respondents, if the weight of the factors in terms of importance is higher than or equal to 50%, the code should be 1; otherwise, it is 0. [Figure 13](#) shows the comparison results.

Discrepancies were not discovered in the case of forces; all participants judged them in the same way. Nevertheless, it can be observed that external rules seem to be less accentuated than the others; a reason could be that participants accept this element as default, so they do not invest time in its analysis. Supplier management has the same feature; however, in this case, there could be more opportunities to develop this element.

COMPARISON OF ANSWERS RANKING Interviewees (1, if pcs of answers ≥ 5 ; 0, if pcs of answers < 5) Respondents (1, if factors weight $\geq 50\%$; 0, if factors weight $< 50\%$)	Interviewees vs. Respondents opinions							
	Four Forces				Four Drivers			
	Requestor	Supplier	Internal regulation	External rules	Strategies	Cross-functional integration	Supplier Management	IT solutions
Interviewees	1	1	1	0	0	0	0	1
Respondents	1	1	1	0	1	1	0	0
Discrepancy (D) or coincidence (C) in answers	C	C	C	C	D	D	C	D

Figure 13. Comparison of answers ranking (Authors' construction).

Researchers did not experience coincidence at the three drivers (strategies, cross-functional integration, and IT solutions), but the approaches were different. Subordinates consider strategies and cross-functional integration to be more important than leaders, whereas leaders regard IT solutions as more vital. This opinion was strengthened during interviews because leaders accentuated the high importance of digital platforms and systems in several cases and from diverse aspects. Subordinates regarded strategies and cross-functional integration as more important; the reason could be that they are more affected during the daily work by cross-functional integration, while they do not have perspectives on strategies.

7.2. Processing of elements mentioned in RQ2

Based on the responses to the open-ended survey question (RQ2), it became apparent that the answers revolve around three factors identified as missing elements: market (suppliers), procurement, and cross-functional integration. In light of these findings, researchers propose minor adjustments to the descriptions of these factors. Since procurement is an integral component of the 4F4D model, the authors suggest enhancing the clarity of the original model by incorporating explanations related to the factors of suppliers and requestors (Figure 14). This refinement aims to ensure a clearer understanding of the model's components and their interconnections.

- To include in the requestors' box the internal customer (in brackets) to indicate that the requestors represent the internal customers who demand purchasing services and who are interconnected by cross-functional integration (communication and cooperation) with procurement.
- To include in the suppliers' box the supply market (in brackets) to indicate that the purchasing organization is directly connected to this market. This correction is significant because there were remarks concerning the market as a missing element in the survey and even one remark during the interview.

7.3. Misunderstanding of strategies in RQ3

In the case of RQ3 (classification of factors as forces or drivers by subordinates), there is only one minor discrepancy between their opinions and the model structure regarding strategies. Additionally, this is the only case where the classification percentages were as close as possible to each other (53% vs. 47%). The reason for this contradiction is – presumably – the confusion between the creation (as a guide or concept) and implementation (as a mandatory action) of the strategies. More

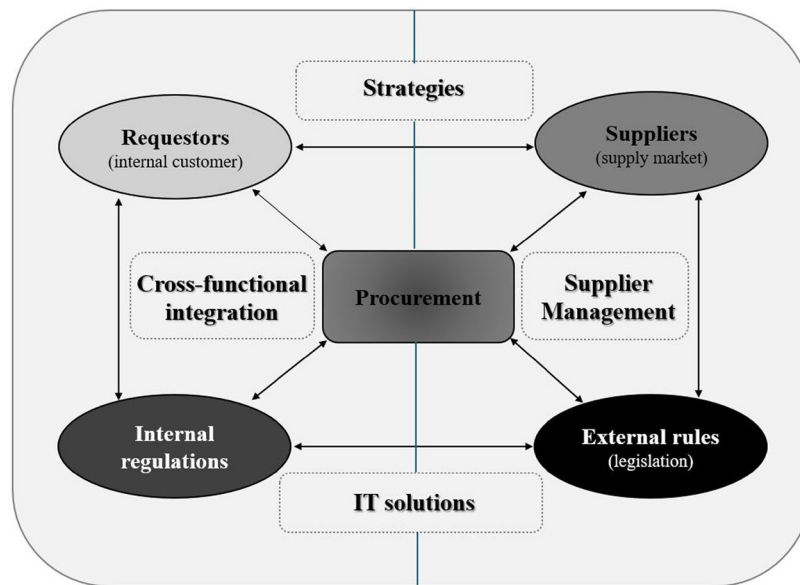


Figure 14. Modified 4F4D model (Adapted from Wittinger, 2022).

precisely, associates could consider that creation and implementation are the same. This is a confusion at the subordinates' level only, since they do not take part in strategy development; thus, they are not aware of the difference between these two terms. For example, if we talk about a strategy (for instance, an investment strategy), it refers to future action (e.g. investments in or acquisitions of something in the future only); thus, it is a concept because it is a planned project only, and it should be considered as guidance because it will be implemented later (or, in some cases, never). Therefore, it is a driver.

If we talk about a rule (even connected to a strategy, such as investment regulation), it is a mandatory instruction because it is connected to something already existing; thus, it must be immediately executed, and therefore, it is a force. As Morris and Jamieson (2005) suggest 'strategy is a means of thinking through and articulating how an organization's corporate goals and objectives will be achieved. This strategy is then typically operationalized at a "strategic" business unit [SBU] level; strategic initiatives are then often clustered into portfolios of programs and projects for implementation' (Morris & Jamieson, 2005, p. 5). In summary, when a strategy becomes a mandatory element to be executed/operationalised, we talk about a rule (as force, e.g. investment regulation); before this point, we talk about principles (as drivers).

In summary, this research underscored the completeness and correctness of the model, highlighting its applicability to purchasing activities. As emphasized by Govindan et al. (2024) in their study, the majority of research papers revolve around conceptual frameworks or architecture, raising the need for more mixed methods, such as those that can be applied during real-life procurement procedures. Delke et al. (2023) underlined in their study the existing debate regarding the gap between academia and practice (in terms of business and management studies) for a long time. Their research confirmed, among other things, that practitioners tend to emphasize operating issues compared to academics. These findings confirm the necessity of an easily usable tool in practice that helps map purchasing operations.

8. Practical implications

The research did not aim to test which particular (decision-making) questions could be supported by the developed model. The crucial goal is to effectively run a purchasing organization that is achievable through efficient purchasing processes. Therefore, it is necessary to reveal weaknesses through tools and

balance operations. Considering that there is no easily applicable model in the hands of leaders (as confirmed during the case study), this presents a gap in purchasing management.

In the long run, only scientific models that accurately describe practical processes will become valuable. Models, such as the Balanced Scorecard (BSC) or Kraljic matrix, are accepted and used in practice because they exactly follow and adequately depict real processes. To assess the viability and applicability of the model in practice, we gathered some issues based on interviews and from suggestions of the open-ended questions in the survey.

ISSUES (examples)	TO BE ADJUSTED TO or STRENGTHENED	
	FACTORS	ACTIONS (examples)
Inefficient cooperation with the internal requestor	Requestors	Try to amend the daily work with the co-department for instance by a more frequent (and cooperative) meeting to enhance the trust among associates.
	Cross-functional integration	Try to understand better the co-worker's point of view, and adjust or alter - if possible - your own opinion.
Too long lead-time	Internal regulations	Revise/modify the internal regulations in case this is the root of the delay; explain that there is a need to comply with the internal requirements.
	IT solutions	Revise/modify the IT solutions in case this is the root of the delay; gather and show the features of delay that are coming from improper IT solutions.
Inappropriate suppliers are selected	Strategies	Define better the purchasing strategies to be followed.
	Supplier Management	Apply a more efficient or introduce a new Supplier Management System.
Failed fulfilment by the supplier	Internal regulations	Revise the internal regulations to avoid - on the purchasing contract basis - an undesired supplier.
	Supplier Management	Be more prudent in how to evaluate and select your partners.
Disadvantageous conditions in cooperation with suppliers	Suppliers	Try to apply a better purchasing strategy, for instance, spread the risk by keeping a vendor pool or seeking new suppliers.
	Internal regulations	Try to modify the compulsory clauses to be applied through a proactive and cooperative attitude inside the company.
Unclear understanding of requirements by procurement associates	Strategies	Train (or replace) the purchasing professionals if they do not understand the company or department strategies.
	Cross-functional integration	Clarify the co-department's requirements if this is the root of the problems.
Inefficient IT workflows	IT solutions	Try to modify/personalize the IT workflows if this is an obstacle (gather the reasons why) in the daily work.
	Cross-functional integration	Explain to the associates of the co-department how to boost - for instance by a more efficient usage - the appliance of the IT workflows.
Uncertainties and market changes	Suppliers	Seek new markets (suppliers) and be prepared for market changes by applying forecasting and prudent cooperation.
	Supplier Management	Change/update (or introduce a new) Supplier Management System adjusted to the actual challenges.
Ineffective usage of modern IT-solutions	Internal regulations	Change the internal regulations to be in line with the new possibilities (e.g. e-auction, e-bidding, etc.)
	IT solutions	Change/update (or introduce new) IT systems, and applications to serve your requirements.
Disadvantageous legislation conditions	Internal regulations	Try to apply smart internal regulations to fend off the mandatory legislation clauses to be applied.
	External rules	Try to apply gradual lobby activity - in case you are a multinational company - to modify to some degree the compulsory clauses to be applied.

Figure 15. Practical applicability of the model (Authors' construction).

Considering that the 4F4D model mirrors real-life purchasing procedures it holds significant practical implications. Therefore, uncovered topics or issues could not occur. As a result, the 4F4D model can be practically applied to address weaknesses or issues in purchasing processes. This tool provides an opportunity to match possible solutions to the revealed weaknesses, offering valuable insights into potential solutions by connecting identified issues with specific factors within the model. This approach enables organizations to develop tailored strategies to effectively address their unique challenges. As demonstrated in this thought experiment (Figure 15), any general issue can be linked to one or more factors (forces or drivers) of the model. If multiple factors are intertwined in causing a particular issue, a holistic or multifaceted solution might be necessary for complex resolution. However, literature identifies numerous solutions for all the issues considered in the table. This approach allows organizations to leverage the comprehensive framework provided by the 4F4D model to enhance their purchasing practices and mitigate risks.

It is essential to recognize that while the 4F4D model can provide practical (viable) solutions to identified issues in purchasing processes, it may not comprehensively address every deficiency. The model focuses on connecting specific factors with corresponding problems identified by purchasing leaders and survey respondents, rather than attempting to address all potential issues in purchasing. Furthermore, it is important to note that the applicability of the model may vary depending on the organization's maturity level and operational structure. Organizations with high maturity levels, featuring centralized activities and formalized operations, are likely to benefit most from the model's use. However, companies in earlier stages of development may need to prioritize achieving this level of maturity before fully leveraging the model's capabilities.

9. Contributions, limitations, and closing remarks

Leading multinational companies typically have well-structured and smoothly operating organizations (Foerstl et al., 2013), developed over many years of practice. However, as confirmed during the interviews, there is a lack of a holistic view or checklist for the purchasing operations. Therefore, there is a need for a tool that can assist in procurement management.

This model can support structuring elements of the purchasing procedure, revealing potential weaknesses for further improvement. It can be utilized as a map or checklist to guide procurement decisions by uncovering weak areas. Moreover, the model has implications for practitioners, serving as a tool for teaching and training professionals (both leaders and subordinates), to recognize weaknesses through factor alignment and subsequently balance them considering that the success of purchasing and supply management largely depends on professionals' knowledge and skill levels (Stek & Schiele, 2021). The 4F4D model also has theoretical potential. Scholars can apply it to comprehend the complex procurement environment, explore the interaction of factors, and identify new research topics. Thus, this model offers both practical and theoretical contributions to the field.

This study has certain limitations that should be acknowledged. The small number of cases and exclusive focus on large companies may restrict the generalizability of the findings. Further research could explore the practical applicability of this model in different company contexts. Additionally, investigating the relationships and interactions among different elements of the model could be a valuable avenue for future research. This involves delving into each factor as a separate research objective to gain a deeper understanding of its dynamics and impact on procurement processes.

The study emphasizes that novelty in a conceptual framework can stem not only from introducing new elements but also from providing a fresh perspective and arrangement of existing elements. It draws an analogy to a recipe, where using known ingredients in different quantities or combinations results in something new. Similarly, while the individual factors of the model are well-known elements that have been studied previously, the novelty arises from their unique combination and structure within the model. The arrangement, classification (forces or drivers), and interrelations of these few factors contribute to the comprehensiveness of the model in depicting real-life procurement procedures. This study underscores that the model's simplicity and transparency enhance its applicability in practice.

Furthermore, the model can serve as a practical toolkit for diagnosing and addressing common procurement challenges. By applying the 4F4D model, purchasing departments can identify key areas for improvement, such as enhancing IT workflows and/or fostering better cross-functional integration. Its application can also be translated into more streamlined operations, better supplier relationships, and reduced process lead-time. Thus, implementing the model's recommendations can lead to a more agile procurement process. The model's application in purchasing can indirectly benefit society by promoting more efficient and sustainable procurement practices. This could lead to improved resource allocation, reduced waste, and ultimately, products and services that are more aligned with societal needs and ethical standards.

The research findings underscore the significance of the 4F4D model as a valuable tool for practical application in the field of purchasing, addressing a gap in available models. Drawing on the insights of over 130 purchasing professionals with extensive experience across multinational companies, coupled with a deep review of existing literature, the model has been validated as both comprehensive (complete in process description) and accurate (correct in shape). One of the key strengths of the 4F4D model lies in its applicability across various contexts, thanks to its clear classification of factors into forces and drivers. This structured approach provides a consistent and general framework for analysis and implementation, regardless of the specific industry or prior purchasing experience. The model's holistic view and lucid structure offer a clear understanding of the complex dynamics within purchasing processes, facilitating its adoption in practical settings.

The insights gathered from interviews with purchasing executives highlight the pressing need to bridge the gap between theoretical concepts and practical application. Researchers are committed to furthering this goal by ensuring that their work not only contributes to theoretical understanding but also provides actionable guidance for both professionals and scholars. By applying the 4F4D model in practice, researchers aim to support practitioners in addressing real-world challenges and achieving greater success in their purchasing endeavours.

Note

1. Note: for practical reasons, we use the terms “purchasing” and “procurement” interchangeably, as suggested by Miemczyk, Johnsen and Macquet (2012). Furthermore, these terms can indicate both the organization and the activity, depending on the context.

Ethical approval

The authors declare that this research is not subject to Ethics Committee approval at Corvinus University of Budapest because it does not fall within the scope of the Committee's approval requirements.

Scope of the provisions

1. Research projects that are carried out from domestic or EU support, and
2. Research ethics issues arise.

Source: Corvinus University Research Ethics Approval Procedure.

Thus, there was no need for the Ethics Committee's resolution because:

- This research was not carried out with any domestic and/or EU support, which exclusively means some grant funding; the authors did not receive any financial support for the research in this sense. The employees' salaries do not fall within this criterion at all.
- There were no ethical issues or risks to be considered, as all the information collected was processed anonymously and accompanied by participants' approval.

Furthermore, the authors declare that they have followed best research practices, ensuring that all participants endorsed the data usage: interviewees provided written consent by signing the Statement, and survey respondents gave their consent by completing the questionnaire.

The authors also declare that this study is low-risk research because the data was processed anonymously. No participant names (individuals or companies) were disclosed, nor was any information provided that could reveal the participants' identities in the research.

Author contributions

Only Maria M. Wittinger (corresponding author) and Krisztina Demeter (co-author) were involved in the research and elaboration of this study. They contributed equally to the present study, and both met all four criteria of ICMJE recommendations in terms of authorship. They both agree to be accountable for all aspects of the work giving their approval to the publication of this version.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The data that support the findings of this study were collected by the authors. There is a restriction to their access considering the non-disclosure statements rest on the anonymity of the survey and the written/signed confidentiality statements by the survey respondents giving their consent to anonymous use only.

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Appendices

Appendix A - Interview guidelines of case study research

A. Interviewer's section

Instruction: Put the question "Do you allow recording of the interview?"

- Introduction of the interviewer and personal motivation.
- Description of the research goal.
- Explanation of the reason for and importance of selecting the given company.

B. Interviewee's section

Instruction: Explain the opportunities regarding how data will be processed (based on the interviewee's statement): a) anonymously or b) openly

1. Questions about the interviewee:
 - What is your job position?
 - When did you start in this position?
 - How long have you worked in this position and in the purchasing area overall?
 - Can you provide a brief overview of your previous positions and the companies you worked for?
2. Questions about the company:
 - Can you give an overview of the company's core activity?
 - What are some key figures about the company, such as revenue, number of employees (FTEs), etc.?
3. Questions about the organisational unit and procurement work:
 - What level is the purchasing organisation within the company hierarchy (e.g., 3rd level or higher/lower)?
 - How is the purchasing organisation perceived within the company?
 - Does the company have a procurement strategy and planning process?
 - Could you describe the daily work in terms of IT systems/platforms/applications and regulation within the procurement department?
 - How many purchasing FTEs are there in the organisation and at the group level?
 - How many suppliers and contracts does the company typically manage?
 - What is the annual purchasing budget for the company?
4. Questions about weaknesses and strengths
 - In your opinion, what are the strengths of the purchasing process, and how do they contribute to the overall business processes?
 - Are there any challenges or weaknesses you encounter in your daily work or within the procurement processes?
 - If so, what are the reasons behind these weaknesses? Do you have any suggestions for improving the organization or increasing its effectiveness further?
5. Questions about "forces" factors
 - What factors, such as people or organizational units, influence your work?
 - Can you provide practical examples of how these various factors impact, influence, or determine the work and purchasing processes in practice?
6. Questions about "drivers" factors
 - What factors, such as concepts, platforms/systems, workflows, or cooperation with different people, influence your work?
 - Can you provide practical examples of how these various factors impact, influence, or determine the work and purchasing processes in practice?

C. Conceptual model's section

Instruction: Reveal the model and explain the concept.

- Do you agree that certain elements exert significant influence on work processes? If so, do you recognize the presence of the following: requestor, supplier, internal regulations, and external rules?
- Do you agree that certain elements serve as key determinants in work processes? If so, do you acknowledge the importance of the following: strategies, cross-functional integration/cooperation, Supplier Management, and IT solutions?

- Do you have any remarks from the perspective of the conceptual model or any suggestions regarding it? Are there any uncovered topics or missing parts?
- Does it have any influence on your opinion, would you like to add (from the discussed aspects) something to your point of view? In other words, does the model change your point of view on how to regard the purchasing environment?
- What do you think, could the model help the daily work in connection with the purchasing activities, also, does it clarify this particular environment?

D. Administrative tasks

Instruction: Statement regarding data processing to be signed by the interviewee.



Corvinus University of Budapest
Department of Logistics and Supply Chain Management

The aim of the research is to examine the Procurement Organisation in the given company, its operating principles, and mechanisms. The Corvinus University of Budapest grants that the data are handled strictly confidentially, stored electronically for 5 (five) years, and used for research purposes only providing anonymity (if required) to the interviewee and company as well. We restrict access to the research material it shall be allowed to the affected researcher only.

STATEMENT OF INTERVIEW

Company's name:

Interviewee's name:

Interviewee's position:

The undersigned certifies that:

The purpose of the research is clear to me, I understand the intent of and my role in this research, and I was able to put my research-related questions.

I give my consent that the interview with me be recorded – including my personal data and company information – as a sound recording for research purposes only.

I declare that the data and information obtained in connection with the research during the interview will be treated confidentially by me.

I declare that the data and information I have provided about the company during the interview can be treated as follows:

- Open
- Confidential

Dated:

Signature:

Appendix B - Questionnaire of survey research



**Corvinus University of Budapest
Department of Logistics and Supply Chain Management**

OBJECTIVE OF RESEARCH

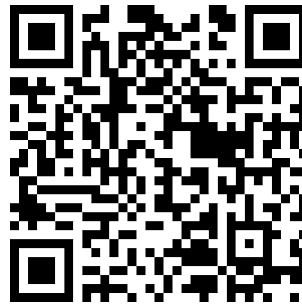
The aim of this survey is to find out a tool that could help identifying factors that can affect the purchasing decisions, reducing the risk of decisions by their identification.

In addition, the research is also part of a doctoral (PhD) thesis, where the complete anonymity is ensured to the respondents and their employing companies.

You can fill out the questionnaire online (it takes cca. 5 min.) via PC, mobile or tablet:

<https://procurementmodel.com>

QR code:



NON-DISCLOSURE AND CONFIDENTIALITY STATEMENT

Researcher(s) ensure(s) that data are handled in a strictly confidential way, used for research purposes only, providing anonymity of both the respondent and its employer company.

We restrict access to the research material it shall be allowed to the researcher(s) only.

Thank you very much for your valuable contribution to our research!

Before completing the questionnaire, we would like to establish a uniform interpretation by defining emerging concepts and outlining the research environment. Please carefully review the definitions, as their consistent interpretation is crucial for accurately and professionally completing the questionnaire. Thank you very much!

In our view, every procurement process (procedure) involves constant elements, including certain actors, conditions, and processes, which can be categorised into summary groups as follows:

Internal regulations: the embodiment and implementation of owner's and management's will (directives) through established rules that regulate already existing and functioning processes (such as procurement regulation, investment regulation, financial and accounting regulation, tax and legal regulation, code of ethics, etc).

Requestors: the internal customers of the procurement service (from co-organizations within the company). They initiate the purchase requisition and demand to purchase a product or service.

IT solutions: electronic/digital systems, platforms, applications for internal and external workflows, and procurement procedures (such as corporate workflows, SRM systems, electronic bidding, auction platforms, etc).

Cross-functional integration: cooperation between different co-organizations (business or functional) within the company, such as for procurement procedures or project works.

External rules: the embodiment and implementation of legislation and government will (national or local directives) through external rules (such as the Tax and Accounting Act, Competition Act, environmental protection rules, construction regulations, etc).

Suppliers: representatives/embodiments of the supply market and relevant business segment providing products and services, serving as the source for necessary resources.

Supplier Management: process and/or system for selecting, evaluating, and managing suppliers, including contract management, performance evaluation and monitoring, and encompassing the entire collaboration.

Strategies: governing (overarching) business principles guiding present and future business processes (such as purchasing, investment, tax, acquisition strategies, etc).

RQ1. Considering a procurement procedure from the submission of a request to the conclusion of a contract, and considering the previous definitions, please indicate – according to your opinion – to what extent do these particular elements influence (in any way, either in the sense of workflow/procedure or in the sense of concluding a contract) the procurement processes?

Choose one answer per line, please.

Factors	Not at all	Slightly	Neutral	Very	Completely
Internal regulations (accounting-tax, finance, law, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Requestors (internal customers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT solutions (systems and applications)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cross-functional integration (cooperation among internal co-departments)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External rules (legislation and rules)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suppliers (representatives of the market)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplier Management (evaluation and selection of suppliers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategies (business principles)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RQ2. If you believe that other element(s) – that are not included in the list – may affect procurement processes, please name them below:

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In our view, these certain elements can be defined as “Forces”, and others as “Drivers” as follows, respectively:

Forces: These elements, including internal and external entities such as persons, organisations, and rules, have the authority to enforce or determine terms that must be included in a contract. During procurement processes, it is necessary to consult them as they influence or impose - beyond the procurement organisation - the inclusion or exclusion of general or specific conditions in a collaboration; thus, these elements can appear as contractual requirements that must be considered or complied with.

Drivers: These elements play a role in connecting and driving procurement processes. They establish a framework and provide a background for procurement work, facilitating connections between actors and guiding procurement processes. They influence the operation and management of purchasing, as procurement procedures are driven by the workflows according to specific strategies, and they take place with the help of or rest on certain systems and applications.

RQ3. Reconsidering a procurement procedure from the submission of a request to the conclusion of a contract, and again considering the previous definitions, please indicate which of the given elements do you consider to be Force and which one to be Driver?

Choose one answer per line, please.

Factors / Classification	FORCE It can enforce contractual terms	DRIVER It connects, drives, provides background and guides
Internal regulations (accounting-tax, finance, law, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Requestors (internal customers)	<input type="checkbox"/>	<input type="checkbox"/>
IT solutions (systems and applications)	<input type="checkbox"/>	<input type="checkbox"/>
Cross-functional integration (cooperation among internal co-departments)	<input type="checkbox"/>	<input type="checkbox"/>
External rules (legislation and rules)	<input type="checkbox"/>	<input type="checkbox"/>
Suppliers (representatives of the market)	<input type="checkbox"/>	<input type="checkbox"/>
Supplier Management (evaluation and selection of suppliers)	<input type="checkbox"/>	<input type="checkbox"/>
Strategies (business principles)	<input type="checkbox"/>	<input type="checkbox"/>

RQ4. How many years of procurement work experience do you have?

- less than 1 years
- more than 1, less than 3 years
- more than 3, less than 5 years
- more than 5, less than 10 years
- more than 10 years

RQ5. What is the name of the company you work for?

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