Purchasing Leadership's Effectiveness in the Adoption of Procurement 4.0: A Conceptual Framework for Future Research

André Tchokogué
HEC Montréal

Thomas Ngniatedema
Morgan State University

Based on a systematic literature review approach, and drawing on the leadership-member exchange and contingency theories, we develop a conceptual model for the purchasing leadership's effectiveness in the adoption of Procurement 4.0 that simultaneously consider different aspects of purchasing leadership effectiveness which are: the purchasing leadership behaviors, the contextual factors, and the quality of the relationship between the purchasing leaders and their subordinates as well as other members of the organization.

In so doing, this study sheds great light on the central role that the purchasing leaders can play in the digitalization of a purchasing function, and offers unique insights on this process, which could provide a fertile ground for future research in this field. Moreover, this study suggests that the purchasing leaders have competencies to build-up the required capacities and capabilities which will support the organizational vision and the digital transformation of the purchasing function.

Keywords: purchasing leadership effectiveness, purchasing leadership behaviors, digital purchasing, procurement 4.0

INTRODUCTION

In a growing body of the literature, Procurement 4.0 is described as a range of innovative technologies that are adopted to support the purchasing processes (Bienhaus and Haddud, 2018; Osmonbekov and Johnston, 2018; Gottge *et al. (2*020; Seyedghorban *et al. (2*020; Tripathi and Gupta, 2021; and Hallikas *et al. (2*021). As Glas and Kleemann (2016, p. 59) point out: "Procurement 4.0 stands for the ultimate digitalization and automation of the function within its company and supplier environment". Therefore, in the context of Procurement 4.0, the digital transformation of the purchasing function can be defined as an initiative that aims to improve a purchasing function by making significant changes to its processes by introducing advanced information and communication technologies (Vial, 2019). As such, the digital procurement practices involve the use of some emerging digital technologies such as big data, IoT, machine learning, and artificial intelligence to support the procurement processes (Srai and Lorentz, 2019). These new tools provide some benefits by increasing the predictability of strategic sourcing, making supplier management more proactive, and the procurement operations more intelligent (Umbenhauer and Younger,

2018). In this regard, previous research suggests that Procurement 4.0 allows forward-thinking companies *to create purchasing systems that not only "do" but "think" and even "learn" to generate greater value for their businesses (Umbenhauer and Younger, 2018; Handfield et al. (2019; Gottge et al. (2020).*

Schreiber *et al.* (2016) acknowledged that a successful digital transformation of a purchasing process delivers a substantial increase in a company value ranging from 5% to 10% of Earnings Before Interest and Taxes (EBIT) through increased innovation. Anaya et *al.* (2015) emphasize that digitalization enables firms to realize the potential benefits of technology and it can contribute to innovation.

That said, emerging technologies are still not widely adopted in purchasing and supply management (Allen, 2019; Gottge *et al. (2*020; Seyedghorban *et al. (2*020). From a survey in the UK industry, Allen (2019) found that over 71% of employees working in the purchasing and supply management functions believed that digital transformation is low in the purchasing processes. Moreover, results from Allen's 2019 survey suggest that the purchasing teams are still spending a third of their time dealing with clerical tasks such as inefficient paper-based processes, with report from 80% of the respondents facing time limitations to make contributions at the strategic level of their companies. Such findings show that the absence of digital purchasing processes hurts the productivity of purchasing teams (Bienhaus and Haddud, 2018; Allen, 2019).

In fact, the importance of Procurement 4.0 technologies in achieving efficiency and resilience of the purchasing activities has been obvious during the COVID-19 pandemic (Harland *et al.* (2021; Jerome *et al.* (2021). In this regard, a survey by Close *et al.* (2020) shows that 75% of executives see digital transformation as an urgent need, and 65% of them indicate their willingness to increase the budget for investing in digital transformation. Along these lines, a significant effort is seen on the Chief Purchasing Officer (CPO)'s agenda in switching to emerging technologies and in developing a data-driven approach for the purchasing functions of their company (Addicoat *et al. (2*023; Bartolini, 2023). For example, Ardent Partners' CPO 2023 Agenda highlights that "Procurement 4.0" is a new challenge and a relevant field which must be managed by Chief Procurement Officers (Bartolini, 2023).

According to Kern *et al.* (2011, p. 122): "The CPO position is a clearly defined role of the senior management team responsible for the leadership of the PSM function." Along these lines of thought, Potter and Paulraj (2020, p. 147) point that "… leaders are often in the best position to identify emerging technologies". For their part, Umbenhauer and Younger (2018, p. 4) claim that: "A clear imperative for procurement leaders at high performing organizations is to lead the procurement, business, supplier and digital agenda." In other words, as a highly competent leader, the CPO is capable for deploying a variety of leadership skills (such as technical, conceptual, and interpersonal) which ultimately allows him/her to exert greater influence on the members of the purchasing department and other departments of the organization (Driedonks *et al. (2*010; Tchokogué and Merminod, 2021).

In fact, it has been recognized that having an effective purchasing leadership in an organization contributes to innovation (Potter and Paulraj, 2020). It provides the capability to adequately respond to changes in supply markets, creatively address some challenges in the business environments, and sustain high performance (Smeltzer, 1998; Giunipero and Pearcy, 2000). In other words, the absence of an effective purchasing leader within an organization inevitably has a detrimental impact on its ability to implement and sustain strategic initiatives such as adopting and deploying Procurement 4.0.

In this regard, the purchasing managers' leadership skills and their behavioral attitude have been cited as critical sources of influence in the organization (Hult and Nichols, 1999; Defee *et al.*2009). However, research interests in purchasing leadership effectiveness and the digitalization of the purchasing function are lagging in the literature. Therefore, we posit the following research questions (RQs)*:*

RQ1: What is the effectiveness of a purchasing manager's leadership in the adoption of Procurement 4.0?

RQ2: What are the key determinants of the purchasing leaders' effectiveness in the adoption of the Procurement 4.0?

To answer these questions, we opt for an approach that simultaneously considers different aspects of the purchasing leadership effectiveness, and which includes the purchasing leadership behaviors, the contextual factors, and the quality of the relationship between the purchasing leaders and their subordinates as well as other members of the organization. Specifically, we address our research questions by offering a comprehensive and integrative framework of the effectiveness of purchasing leadership and some suggestions for future research.

The next section reviews the literature on the effectiveness of purchasing leadership. We then present a conceptual framework for the effectiveness of purchasing leadership while putting forward three proposals that offer fertile ground for future research. We proceed with the discussion of the main components of the proposed model; followed by some concluding remarks as well as the managerial implications of this research.

PURCHASING LEADERSHIP LITERATURE

There is an extensive purchasing and supply management (PSM) literature that focuses on the evolution of leadership skills in the business environment, its implications on PSM processes and on the required purchasing leadership effort that leads to organizational success (Giunipero *et al. (*2006; Karttunen, 2018; Ellram *et al. (*2020; Beske-Janssen *et al. (*2023). This trend has long been acknowledged by Kolchin and Giunipero (1993) who stated that leadership would be one of the critical purchasing/supply management skills required for the 21st century.

In their recent systematic literature review of PSM skills, Stek and Schiele (2021) found that many authors (Giunipero and Pearcy, 2000; Tassabehji and Moorhouse, 2008; Knight *et al. (*2014; Karttunen, 2018) identify (and classify) leadership as one of the key purchasing skills that lead to organizational success.

From the technology adoption and deployment standpoint, previous studies have found the digital transformation of the purchasing function to be somewhat complex (Bienhaus and Haddud, 2018; Ocicka, 2021). Based on this observation, these authors believe that the leader's behavior in a purchasing function is an important factor that leads to a successful integration of Procurement 4.0 into the organization. The implicit rationale in this reasoning is that through their behaviors, the purchasing leaders become the catalysts of change, steering their teams towards a future where Procurement 4.0 not only enhances operational efficiency, but also contributes strategically to the success of the entire organization (Schreiber *et al. (*2016; Tripathi and Gupta, 2021; Althabatah *et al. (*2023).

We build on a systematic literature review to identify the critical behaviors of the effective purchasing leaders.

A Systematic Review of the Literature

We performed a content analysis of the selected papers. Content analysis is an appropriate method for conducting a comprehensive review of the literature and it can be used as an instrument for finding key ideas and topics in publications (Cullinane and Toy, 2000), or for measuring trends in reporting (Miyazaki *et al.*, 1999; Guthrie *et al. (*2004; Spens and Kovács, 2006). It is described as a reliable and objective methodology which allows for a systematic study of existing publications on a given topic (Kolbe and Burnett, 1991; Schneider and Wallenburg, 2013).

This study therefore builds on an established procedure for content analysis (Spens and Kovács, 2006; Wynstra, 2010; Seuring and Gold, 2012; Schneider and Wallenburg, 2013; Durach *et al. (*2017). Specifically, we use a three-stage process in this study. As suggested by Tranfield *et al.* (2003) and Seuring and Müller (2008), these three steps are: (1) the material collection (the material to be collected is defined clearly); (2) the category selection (general aspects, e.g., publication year, research type, and specific aspects of the material to be assessed are selected); (3) the material evaluation (also called "content coding" and the analysis of the papers selected according to the categories defined in stage 2).

Material Collection and Category Selection

In order to identify the articles which are relevant to our research orientation, we performed a database search in June 2022, in "ABI/INFORM Complete", by putting four groups of key words in different combinations (i.e., "Suppl" OR "Purchasing" OR "Procu" AND "Leadership" / "Suppl" OR "Purchasing" OR "Procu" AND "Leaders" / "Supply managers" OR "Procu" managers AND "Leadership") / "Suppl" OR "Purchasing" AND "Procurement 4.0"). We restricted to papers published in scholarly or peer reviewed journals, written in English, and published up to 2022. This initial search resulted in 669 articles (see figure 1).

We initially checked the titles of the 669 articles for relevance: the duplicates titles and papers with titles beyond the scope of our review orientation were removed. We then read the summaries of the remaining articles. With this procedure, the list was narrowed down to just 40 articles. Indeed, the word "leadership" appeared in many articles, but it wasn't part of the research focus in most of them. We only retained articles in which the concept leadership was defined with accuracy and was part of the research focus in the paper.

To ensure that all relevant papers were included in our search, we carefully examined the full text in all papers; studies that only mentioned the concept purchasing/supply leadership briefly or those without an explicit 'purchasing leadership' perspective were rejected. This resulted in 19 papers being excluded because of inconsistent content related to the supply manager's leadership. We also performed snowballing (i.e., checking the references of relevant articles) and we followed the Google Scholar updates for relevant articles to identify the most recent publications. This process resulted in five additional articles being retrieved based on the references sections of the 21 papers we previously retained. Thus, our research builds on 26 papers that were fully reviewed (see Appendix 1). Indeed, the sample obtained through this search methodology includes all the relevant papers which were published up to 2022. Therefore, our systematic search approach provides a relatively complete census of the relevant literature.

FIGURE 1
FLOW DIAGRAM OF THE LITERATURE SELECTION PROCESS
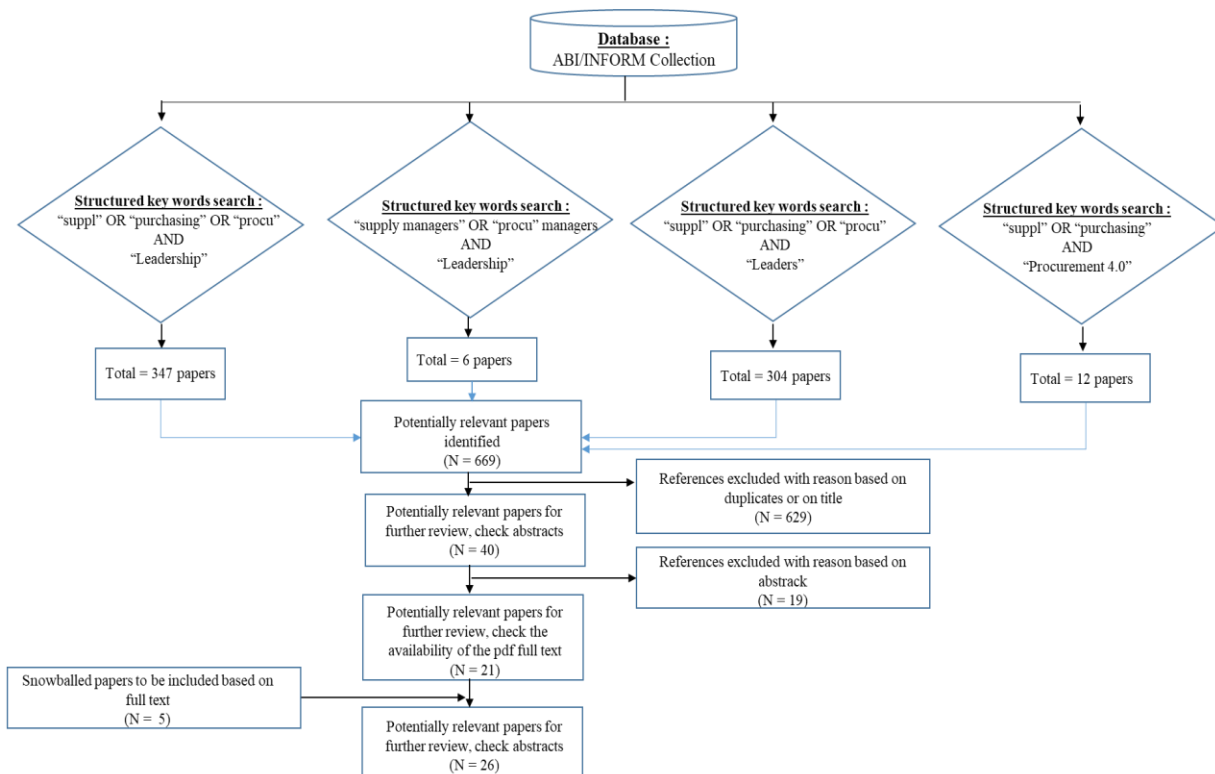
Material Evaluation: Content Analysis

Many authors describe content analysis as a methodology that is based on a coding scheme (Guthrie *et al. (*2004; Spens and Kovács, 2006). Therefore, in developing our coding scheme, some steps were taken to increase our search result's objectivity, validity and reliability. As a first step, we randomly picked a sample of five articles from the initially selected articles. Secondly, we conducted two cycles of reliability analysis of these five articles. From this analysis, six critical purchasing leadership behaviors which can drive the effective adoption and deployment of Procurement 4.0 emerged: (1) visionary leadership and strategic alignment, (2) leadership, (3) data-driven decision-making approach, (4) collaborative leadership, (5) change management and adaptability and, (6) ethical leadership. These core behaviors were used as our coding scheme.

Based on this coding scheme, we performed a detailed analysis of each paper that was selected in order to associate to each of these papers the core behaviors mentioned earlier (see Table 1).

TABLE 1
THE ESSENTIAL BEHAVIORS OF THE EFFECTIVE PURCHASING LEADERSHIP

Key behaviors	*Authors*
- Visionary leadership and strategic alignment	Anderson and Katz (1998); Fredendall *et al.* (2005); Geissbauer *et al.* (2016); Hawkins *et al.* (2011); Johnson and Leenders (2009); Potter and Paulraj (2020); Smeltzer (1998); Scheuing (1998); Tony and Kwai-Sang (2007); Umbenhauer *et al.* (2017); Williams (1995).
- Technological leadership	Camarero Izquierdo *et al.* (2015); Bienhaus and Haddud (2018); Kosmol *et al.* (2019); Ocicka, (2020); Potter and Paulraj (2020); Tripathi and Gupta (2021).
- Collaborative leadership	Anderson and Katz (1998); Bienhaus and Haddud (2018); Carter *et al.* (2009); Hult, Ferrell *et al.* (2000); Fredendall *et al.* (2005); Hult *et al.* (1998); Hult and Nichols (1999); Hult, Hurley *et al.* (2000); Potter and Paulraj (2020); Tchokogué and Merminod (2021); Tellefsen (2006); Tony and Kwai-Sang (2007); Trent (1996).
- Data-driven decision-making	Anderson and Katz (1998); Bienhaus and Haddud (2018); Tripathi and Gupta (2021); Umbenhauer *et al.* (2017).
- Change management and adaptability	Anderson and Katz (1998); Bienhaus and Haddud (2018); Camarero Izquierdo *et al.* (2015); Etse *et al.* (2022); Potter and Paulraj (2020); Scheuing (1998); Smeltzer (1998); Tchokogué and Merminod (2021).
- Ethical leadership behaviors	Etse *et al.* (2022); Ho and Lin (2016).

The Purchasing Leadership Behaviors and the Emerging Technologies Adoption
Visionary Leadership and Strategic Alignment

Bartolini (2023) believes that the ability to formulate and communicate a company's strategic vision is a fundamental behavior of an effective purchasing leader. This is particularly important with regard to the emerging technologies adoption. A purchasing leader must possess a forward-thinking mindset, anticipate the industry trends, and cope with the market pressures of technological innovation (Kosmol *et al. (*2019). From the Procurement 4.0 standpoints, Geissbauer *et al.* (2016, p. 5) stated that the "…Chief Procurement Officers need to rethink the value added by the purchasing function within the company." Hence, in the Procurement 4.0 age, the effective purchasing leaders are those who exhibit visionary leadership skills by having a clear understanding of the opportunities that the technology innovation present (Geissbauer *et al. (*2016), and by aligning the adoption of Procurement 4.0 with the overall organizational strategy. Accordingly, a successful purchasing leader is a visionary manager who can predicts the future changes needed in the purchasing function as well as in the overall company, but also a leader who has the willingness to commit the resources and implement the changes needed to make his vision a success (Umbenhauer *et al. (*2017; Bartolini, 2023).

Technological Leadership

According to Camarero Izquierdo *et al.* (2015), a purchasing manager's leadership skill is an essential characteristic needed to cope with technological innovation and to promote an effective use of the Information and Communications Technology (ICT) in the purchasing process. This argument adheres to Beske-Janssen *et al.* (2023)'s ideas that the purchasing leadership skills should be viewed as "holistic procurement competences" that contribute to both innovation and sustainability. In this contention, to be successful, purchasing leaders have to operate as change agents, thereby fulfilling their role as transformational leaders (Trent, 1996; Hult *et al.*, 1998).

A purchasing leader must be able to guide employees through the digital transformation process while motivating them to adhere to this change, which will ensure a sustainable long-term success (Bienhaus and Haddud, 2018; Tripathi and Gupta, 2021). Therefore, a purchasing leader has to identify the bottlenecks and challenges at the macro-level of the company and defines the appropriate actions needed to implement them within the entire organization (Umbenhauer *et al. (*2017; Gottge *et al. (*2020). Therefore, the effective purchasing leaders are the ones who invest on their personal developments and that of their subordinates, recognizing that a knowledgeable and skilled workforce is a key asset in achieving the purchasing function objectives (Bag *et al. (*2020; Jahani *et al. (*2021).

Collaborative Leadership

There is some empirical evidence pointing to the importance of managing the digital transformation of the purchasing function using a collaborative approach and by including all supply chain members as well as securing the supply chain ecosystem (Bienhaus and Haddud, 2018). In fact, the purchasing leaders must effectively convey expectations, requirements, and strategic objectives to the employees inside the organization as well to the external stakeholders. In this regard, a clear communication by the purchasing leaders is needed to foster collaboration and to minimize the risk of information mismatch, ensuring that every participant in the purchasing process is aligned with the overarching organizational goals (Umbenhauer *et al. (*2017; Gottge *et al. (*2020). Therefore, an effective purchasing leader is a knowledgeable manager who understands the importance of collaboration and cross-functional teamwork, which is critical to the success of the digitalization of the purchasing function (Umbenhauer *et al. (*2017; Kosmol *et al. (*2019). The collaborative approach ensures that the benefits of Procurement 4.0 are realized throughout the entire value chain (Kosmol *et al. (*2019; Răzvan-Andrei *et al. (*2023).

Data-Driven Decision-Making

As described in the literature, Procurement 4.0 provides support to complex decision-making processes. It refers to a data-driven approach used to derive solutions of supply management-related problems (Gottge

*et al. (2*020). Thus, it is useful when analysing a huge amount of data nearly in real time and it is also useful in highlighting the most feasible solutions (Legenvre *et al. (2*020; Tripathi and Gupta, 2021).

To truly benefit from Procurement 4.0, a company should posses an effective purchasing leader who has the ability to cultivate and promote a culture where data is seen as a strategic asset. Among other things, an effective purchasing leader must promote the development of good analytical skills needed for interpreting complex datasets and extracting meaningful insights which could aid decision-making (Handfield *et al. (2*019; Gottge *et al. (2*020).

Change Management and Adaptability

According to some empirical studies a successful purchasing leader tend to possess high transformational skills (Smeltzer, 1998; Tchokogué and Merminod, 2021). Hence, he/her should be viewed as a driving force of change in the digitalization of the purchasing function.

According to Izquierdo *et al.* (2015, p. 269): "Transformational leadership skill of a purchasing manager is an emerging tool which can generate more intense and effective use of information and communication technologies, and it can serve as means of enhancing performance." This thought adheres with MacManus (2002) and Nurmandi and Kim (2015) studies who found a positive correlation between leadership and organizational innovation, particularly for the case of IT adoption. For example, MacManus (2002) found that leadership was a key enabling factor to the implementation of the e-procurement systems. This author however offered a cautious and incremental perspective on the diffusion of this technology. In fact, MacManus (2002) suggests that a purchasing leadership behavior should be viewed as an important factor affecting the institutionalization of the e-procurement processes in an organization. This author's suggestion also applies to the adoption and deployment of procurement 4.0, representing a significant change in how the procurement process operates.

In fact, the effective purchasing leaders recognize the importance of change management and are adept at guiding their teams through the transitional phases (Umbenhauer *et al. (2*017). This is in line with Bartolini (2023, p. 37)'s point of view; who wrote: "The true test of a CPO's leadership lies not only in making decision but also in preparing, leading, and navigating their teams towards success." These leaders can promote a culture of adaptability and resilience, emphasizing that the journey towards the digitalization of the purchasing processes is not a one-time event but an ongoing process that requires a dynamic response to the fast pace of technological changes and the market conditions (Handfield *et al. (2*019; Seyedghorban *et al. (2*020).

Ethical Leadership Behaviors

Previous research suggests that effective purchasing leaders can bridge organizational behavior and ethics (Hawkins *et al. (2*011; Ho and Lin, 2016). Through their ethical behaviors, the purchasing leaders can facilitate the IT adoption in the purchasing function within the organization. Their ethical behavior helps build trust both internally and externally, mitigating the risks associated with data confidentiality and security concerns (Bienhaus and Haddud, 2018). Specifically, the purchasing leaders with strong ethical skills can ensure that the adoption of some emerging technologies (such as Artificial Intelligence (AI), Big Data, and Blockchain) aligns with the societal pressure such as meeting the ethical standards and complying with the government regulations.

In sum, the effectiveness of the purchasing leaders in the adoption of Procurement 4.0 is intrinsically tied to the six essential behaviors listed in Table 1. It's our contention that by building on such behaviors, the purchasing leaders can significantly boost employee loyalty, commitment, trust and admiration; thus, increasing the overall effectiveness of the Procurement 4.0 adoption in the organization.

From this perspective, Bienhaus and Haddud (2018) show that one of three top potential barriers to the digitalization of the purchasing function is the management leadership style within an organization with regard to supports for innovation. It is also clear that, the influence and persuasion capability of the purchasing leaders can vary greatly from one organization to another, depending on some key factors such as the importance of the purchasing leader' position in the organization and his or her reporting privileges (Anderson and Katz, 1998; Johnson and Leenders, 2009). We argue that these factors may significantly

influence the purchasing leadership effectiveness with regard to the adoption of emerging procurement technologies. They are recognized as situation-based factors that can greatly influence the purchasing leadership effectiveness (Waters, 2013; Kull *et al. (*2019).

Overall, while recognizing the importance of the purchasing leaders' behaviors in the digital transformation of the purchasing function, we must take into account other factors that have the potential to impact the effectiveness of the purchasing leaders' behaviors. In other words, a comprehensive model that simultaneously considers different aspects of the purchasing leadership effectiveness is needed. Thus motivating the model we propose in the next section.

CONCEPTUAL FRAMEWORK, THEORY, AND PROPOSITIONS

As Hughes and Ertel (2016) pointed out, the trend towards the digitalization of purchasing processes is at the root of a new "procurement paradigm" that requires more leadership skills from purchasing leaders. For example, they should adopt a cross-functional collaboration approach to effectively coordinate activities across multiple organizational functions so as to minimize or eliminate the risks associated with the silo effect.

Previous research shows that to be successful as an influential figure, a leader should exhibit a proactive behavior (Yukl, 2008; Eisenberger *et al. (*2010). Building from these studies, we identify six essential purchasing behaviors presented in Table 1. They can facilitate the purchasing leaders' tasks to adequately manage emotional, technical, ethical, and cultural considerations with regard to the digitalization of the purchasing function. From this point of view, Yukl (2012) explains how it is necessary to examine the leaders' behaviors during their interaction with the target population in a mutually consistent way if one wishes to assess the effectiveness of their leadership skills.

In the case of Procurement 4.0 adoption, other important aspects to consider are the quality of the relationship which exists between the leaders of a purchasing department and their subordinates, and other members of the organization; as well as other contextual factors such as the organizational culture. To better frame our argument, we build on two major theories: the leadership-member exchange (LMX) and contingency theories.

Building on these two theories, we establish the links between the purchasing leadership behaviors, the quality of relationship between the purchasing leaders and their subordinates and/or other members of the organization, the contextual factors, and the purchasing leadership effectiveness (see Figure 2).

FIGURE 2
A CONCEPTUAL FRAMEWORK
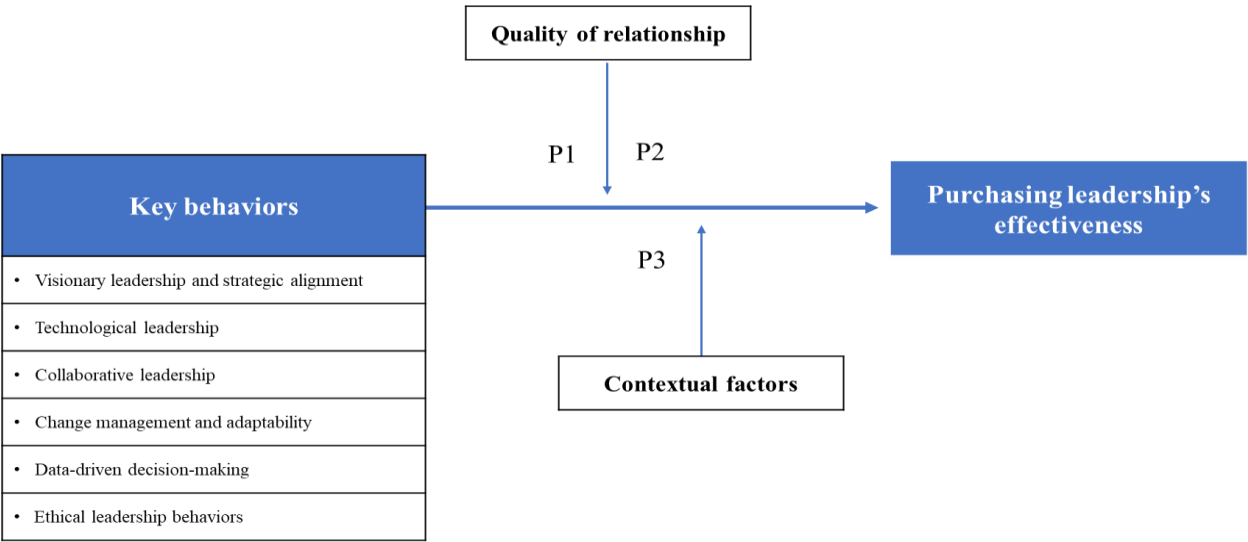
Following the LMX and contingency theories, Figure 2 illustrates how the effectiveness of the influential behaviors of the purchasing leaders depends on one hand, on the quality of the relationship between these leaders and the staff; and on the other hand, on other contextual variables. In the model, we identify two types of moderators while establishing the relationship between the proactive behaviors of the purchasing leaders and the effectiveness of their leadership skills. We therefore use the LMX and the contingency theories as theoretical foundations of our research proposals.

Analyzing the Effectiveness of the Purchasing Behaviors Through the Lens of the LMX Theory

It seems clear from previous studies that the digitalization of the purchasing processes is a key topic for firms in all industry sectors, and that the purchasing leaders needs to take a more active role in shaping the digital journey within the firm and with the key suppliers (Kosmol *et al. (2*019; Tripathi and Gupta, 2021). Nevertheless, the purchasing function, which is the primary host of the system used for interacting with suppliers, can maintain - and even enhance - its distinctive value proposition within the company by seizing some of the new opportunities offered by the digitalization initiative. Umbenhauer and Younger (2018) claim that this digitalization of the purchasing function will strengthen its role, add some value to the participating firms in the value chain, and assure growth of the company.

Because success in the digital transformation of the purchasing function depends upon the employee commitment and on top management motivation and support, understanding which leadership behaviors in the purchasing function are really effective in the digitalization initiative is of great importance. This is especially important in the case of Procurement 4.0. In fact, the key influential behaviors listed in Table 1 can be mobilized by the purchasing leaders in order to promote and facilitate the adoption and application of the emerging technologies such as Procurement 4.0.

Some studies show that in the context of the digitalization project, the influential behaviors of leaders do impact the motivation of their subordinates and other potential staffs, as well as the effectiveness of their leadership skills (Lam *et al. (2*015). Accordingly, the leadership-member exchange (LMX) theory (Eisenberger *et al. (2*010) is well suited for analyzing the purchasing leadership effectiveness. The LMX theory emphasizes that several benefits exist for establishing a high-quality relationship between a leader and his/her subordinates or other organization members. Yukl (2010) noted that subordinates who have favourable relationships with their manager are likely to support their leader's initiatives more. This leadership support and the trust in the relationship with the leader might impact the effectiveness of the various influential behaviors.

We therefore believe that the effectiveness of the purchasing leaders in building the employee support during the implementation of the Procurement 4.0 initiatives is driven by the purchasing leaders' use of some proactive behaviors as well as the quality of their relationships with subordinates and other members of the organization. A high-quality interaction of the purchasing leaders with their subordinates and other employees strengthens the direction of the effectiveness of various influential behaviors. Based on these observations, it can be inferred that the purchasing leaders' relationship, as measured by the LMX theory, moderates (P1) and mediates (P2) the effectiveness of the influential behaviors of the purchasing leaders. Hence, we posit that:

P1: The effectiveness of the purchasing managers' leadership behaviors toward their subordinates and other employees to commit to the Procurement 4.0 initiative is moderated by the quality of this vertical relationship.

P2: The effectiveness of the purchasing managers' leadership behaviors toward their subordinates and other employees to commit to the Procurement 4.0 initiative is mediated by the quality of this vertical relationship.

Contextual Factors and Purchasing Leadership Effectiveness: When Contingency Theory Is Relevant

The purchasing leadership effectiveness does not occur in isolation but instead, it is driven by a context factor (Potter and Paulraj, 2020). For instance, the hierarchy and the power structure of the decision-making process in the organization ranging from the operational level to the strategic level may shape the purchasing leadership's behaviors. In fact, some evidence exists in the literature showing that a high level of hierarchical position and legitimacy increase a purchasing leader's power within the organization and its surrounding business environment (Cousins *et al.* (2006; Tchokogué *et al.* (2017). Needless to say, the closer the purchasing leader is to the organization's strategic level, the more likely he/she will be involved in the strategic decision-making process (Carr and Pearson, 2002; Johnson and Leenders, 2009; Luzzini and Ronchi, 2011). Hence, the purchasing leadership behaviors and the effectiveness of their efforts may vary from one organization to another, differences which may be due, among other things, to some contextual factors.

Some studies have shown that there is a positive correlation between contextual factors (such as organizational culture, the power plays in the organization, the access to information), and the leadership effectiveness (Berson *et al.* (2006; Walter and Bruch, 2010; Andrzej Krzysztof *et al.* (2022). In other words, the effectiveness of the purchasing leaders' behaviors is contingency dependent. Therefore, the contingency theory (Kerr *et al.*, 1974; Peters *et al.*, 1985) is ideally suited for analyzing the effectiveness of the purchasing managers' behaviors in a context such as the digitalization of the purchasing function.

This analytical perspective converges with the ideas presented by previous researchers. In fact, Gottge *et al.* (2020) and Lorentz *et al.* (2021) stress that organizations should consider the existing processes from a system perspective and align them with their IT strategy. In doing this, it will help them discover the areas of improvement that could be useful in digitalizing the purchasing processes. In addition, during this digitalization initiative, the new procurement role within a supply network requires the definition of new tasks, roles, and responsibilities for the organizational functions as well as for these employees (Gottge *et al.* (2020; Tripathi and Gupta, 2021). In this regard, Bienhaus and Haddud (2018) emphasize that the existing infrastructure, job functions and leadership style can either facilitate or hinder the digital transformation initiative. The contextual variables herein determine the success in the digital transformation process of the purchasing function.

The literature also recognizes other purchasing leadership behaviors, such as the passive leadership behavior that may be predominant in some organizations (Cortes and Herrmann, 2021; Samimi *et al.* (2022). This may be due to certain contextual variables like the organizational culture or the organizational structure. Also, some situation-based factors can impact the effectiveness of the purchasing leaders (Waters, 2013; Kull *et al.* (2019; Maehraein *et al.* (2023). Given that the influential and persuasion capability of the purchasing leaders are critical assets to the organization (Johnson and Leenders, 2009; Luzzini and Ronchi, 2016), leveraging on such assets can vary greatly from one company to another, depending on some contextual factors (Anderson and Katz, 1998; Johnson and Leenders, 2009). We therefore posit that (P3):

P3: The effectiveness of the leadership behaviors adopted by the purchasing leaders to boost the adoption and deployment of Procurement 4.0 is moderated by the contextual factors.

DISCUSSION

While some researchers argue that digitalization will be an important consideration for firms in all industry sectors in the years to come (Glas and Kleemann, 2016; Jerome *et al.* (2022; Umbenhauer and Younger, 2018), others show that the level of digitalization across the purchasing functions is lower and its speed slower than expected and needed (Allen, 2019; Křenková *et al.* (2021; Bienhaus and Haddud, 2018). These observations are likely an invitation to managers and to the purchasing leaders in particular, to contribute more to the digitalization readiness of the purchasing function in their organization. Batran *et al.* (2017, p. 21) acknowledge this aspiration by calling for new leadership models. In the context of Procurement 4.0, Reinhard *et al.* (2016) also emphasize how the CPOs need to rethink the value-added

proposition of the purchasing function within the company. In other words, the purchasing leaders must have, among other things, a vision and a willingness to commit resources to help execute their digital strategy.

This suggestion converges with the idea that a digital procurement practice requires a very different skill set from the purchasing managers (Batran *et al.* 2017; Srai and Lorentz, 2019). In fact, the belief that the purchasing leaders must play an active role in shaping the digital journey, both within the company and at the interface between the company and its key suppliers, is gaining traction in both the research community and the industry. Thus, the effectiveness of the purchasing leadership behavior should be seen as a key success factor in adopting Procurement 4.0. Building from previous research (Kosmol *et al. (*2019; Křenková *et al. (*2021; Bienhaus and Haddud, 2018), our study suggests that the key determinants of the purchasing leaders' effectiveness in adopting Procurement 4.0 are twofold: the purchasing leadership behaviors, and contextual variables; and that the quality of the relationship between the purchasing leaders and various stakeholders in the organization is a moderating factor in this relationship.

Specifically, we highlight six main categories of the purchasing leadership' behavior through which the purchasing managers can impact the digital purchasing readiness, at both the organizational level (adoption phase) and at the individual level (users' acceptance). This analysis is consistent with previous studies (Brandon-Jones and Kauppi, 2018; Kosmol *et al. (*2019) which stress that the contributing factors to the adoption of the digital procurement technologies can be located at three levels of analysis: the individual level (e.g., users' acceptance), the organizational level (e.g., management support), and the environmental level.

Purchasing Leadership's Behaviors and the Digital Purchasing Readiness

This study confirms that some key contributing factors to the adoption and use of technology are tied to the companies' readiness to embrace such digitalization initiatives (Kros *et al. (*2011; Richey *et al. (*2007). It suggests that in the context of Procurement 4.0, the purchasing leaders can do more to strengthen the readiness of the digitalization of the purchasing function- which is defined as "… the company's ability to embrace and use new digital technologies in purchasing and supply management" (Kosmol *et al. (*2019). Based on previous studies (Kosmol *et al. (*2019; Srai and Lorentz, 2019), there are three dimensions of readiness for the digitalization of the purchasing function: (1) technological readiness, (2) organizational readiness, and (3) environmental readiness. Each of the six core purchasing leaders' behaviors (see Table 1) can significantly impact these three dimensions.

First, based on previous research (Kosmol *et al. (*2019; Richey *et al. (*2007), technological readiness is a key success factor in the decision to adopt new technologies in purchasing. It's worth noting that technological readiness is defined as a company's "ability to embrace and use new technological assets" (Richey *et al. (*2007, p. 195) in the purchasing function. In this regard, our study suggests that the six core purchasing behaviors in Table 1 should be seen as key determinants of technology readiness in the purchasing function. For instance, visionary and technology leadership behaviors are some of the main antecedents to the digital transformation of the purchasing function.

We make the case that, through their visionary, technological, and ethical leadership, the purchasing managers can contribute to the technological readiness by anticipating that the needed requirements are met on two levels: 1) the information technology infrastructure that enables the digitalization of a purchasing function, and 2) the human resources with the knowledge and skills needed to implement Procurement 4.0 technologies. Based on our reasoning and results, we argue that adopting Procurement 4.0 requires a company to have professionals in the purchasing function who have the technological knowledge and skills necessary to successfully adopt and deploy the procurement technologies. Consistent with this argument, Umbenhauer and Younger (2018) have highlighted that a direct correlation exists between the stronger leadership capabilities, high investment on training, and enhanced performance.

Second, it is clear that organizational readiness is another key factor in managerial decision to adopt new technology in the purchasing function (Kosmol *et al. (*2029; Richey *et al. (*2007). It's one of the key prerequisites an organization must meet before adopting and/or using new digital technologies (such as big data analytics, artificial intelligence, to name a few) in the purchasing processes.

Previous studies have shown that the top management support, the organizational structure, and the available financial resources are the three main indicators of the organizational readiness (Chen *et al. (2*016; Kosmol *et al. (2*019). We make the case that the purchasing leadership behaviors are critical factors to account for in the digitalization of the purchasing function. Indeed, they may significantly influence the degree to which the top management understands and appreciates the potential value of digital transformation of the purchasing function and the degree to which they champion and promote the use of Procurement 4.0 technologies and practices in purchasing. For example, trough their managerial leadership skills, the purchasing managers can influence the top management to direct the financial and human resources toward the purchasing function, moreover, they can facilitate changes of organizational norms, values, and culture (Chen *et al. (2*016). Thanks to their visionary and collaborative leadership behaviors, purchasing managers can help the organization make a real contribution to organizational readiness, not least by ensuring that the organization makes the best possible choices, particularly with regard to the roles, responsibilities and interfaces needed to coordinate and integrate digital procurement practices within the company and with external partners.

Third, based on a supply network perspective, the supplier-side readiness is another key factor in the decision-making process for the new technology adoption. Among others, Mishra *et al.* (2007) have acknowledged the relevance of suppliers as an environmental factor. It is therefore worth considering the importance of the purchasing managers' leadership contribution to the readiness of technology adoption at the supplier-side**.** For instance, the visionary, technological, and ethical leadership skills can influence the degree to which a firm's supplier can embrace and use digital technologies when interacting with customers (Barua *et al*. (2004; Richey *et al. (2*007). It has already been proven that when the suppliers have a high level of digitalization, the purchasing companies can engage in e-business with them, and that suppliers with low level of digitalization can hamper the customer's efforts in implementing the digitalization of cross-organizational purchasing practices (Agi *et al. (2*005; Mishra *et al*. (2007). It has also been proven that a lack of supplier-side digital readiness can inhibit the supply networks' digitalization efforts (Wiengarten *et al. (2*011). Purchasing managers' leadership in identifying preferred suppliers and the level of their digital readiness is therefore paramount.

Moderating and Mediating Factors

Previous studies highlight that the drivers and speed of the digital transformation of a purchasing function vary among companies (Bienhaus and Haddud, 2018; Kosmol *et al. (2*019; Křenková *et al. (2*021). From this perspective, Srai and Lorentz (2019) show that companies which have a workforce with basic technology literacy are more likely to deploy and use advanced digital technologies. Some studies conducted at the practitioner's levels show that a significant numbers of purchasing leaders are not considering nor applying new technologies at all, and that the adoption rate for new technologies in the purchasing function is significantly lower than the application of advanced technologies in other business functions (Reinhard *et al. (2*016; Umbenhauer and Younger, 2018). This finding suggests that the contextual variables specific to each company significantly influence the purchasing leadership's effectiveness. Our study clearly provides support to this assertion.

In light of the challenges tied to the adoption of Procurement 4.0, it is clear that the digitally maturing organizations are the ones managed by suitable purchasing leaders who can plan the digital purchasing strategy ahead of time, make adequate investments in advanced technologies, attract technology savvy talent, and develop a digital organizational culture. Such purchasing leaders see the digitalization of a purchasing function as more of an opportunity than a threat. Thus, their leadership behaviors significantly contribute to the success in the digital transformation effort of the purchasing function (Křenková *et al. (2*021).

Needless to say, the adoption of digital technologies (e.g., e-procurement) can also be moderated by various environmental factors; these include the institutional context (Kosmol *et al. (2*019) and the competitive landscape (Kosmol *et al. (2*019; Chen et al. (2016). This provides credence to our study in the context of Procurement 4.0.

Consistent with Kosmol *et al.* (2019)'s findings, our study points to the fact that various factors might exert a mediating or moderating effect on the link between the managerial leadership behaviors of purchasing managers and their effectiveness in the context of Procurement 4.0 adoption. These relate in particular to the institutional context, which encompasses a broad range of factors such as IT expertise in the labor force, leaders' attitudes toward new technologies adoption such as Procurement 4.0, data protection regulations, and the Internet connection speed (Saldanha *et al.* (2015; Bruque-Camara *et al.* (2016).

In addition, the quality of relationship is a factor known to potentially exert a key moderating effect on the link between the purchasing managers' behaviors and the effectiveness of their leadership skill in the Procurement 4.0 adoption. The quality of relationship between the purchasing leaders and the members of top management can either influence: (a) the adoption (organizational level) and the acceptance (individual level) of Procurement 4.0; and (b) the decision on which digital procurement practices a purchasing company plans to adopt for a particular buyer-supplier relationship. Furthermore, our study finds trust to be another contextual factor that exerts a moderating or mediating effect on the link between the purchasing managers' behaviors and the effectiveness of their leadership skill. A lack of trust in the relationship between the purchasing leaders and the members of other business functions might make top management hesitant to implement new technology that integrates and provides information visibility with their network partners.

In sum, our study shows that adopting Procurement 4.0 means building new value propositions, and integrating data across business functions and value chains, while introducing new digital processes and tools to the workforce and other stakeholders. Perhaps and most importantly, this initiative will require a fundamental reshape of the procurement function in the organization and its ability to meet challenges and seize opportunities imposed by the expanding global digital revolution. Our study shows that in such context, the effectiveness of a purchasing leadership is a key success factor.

RESEARCH IMPLICATIONS

Our study shows, among other things, that the purchasing leadership behaviors can facilitate an inclusive and a collaborative decision-making process, particularly concerning the digital transformation process of the purchasing function (Schreiber *et al.* (2016; Potter and Paulraj, 2020). Thus, as the field of purchasing and supply management continue to grow in importance; the purchasing leadership behaviors are critical factors that contribute to success, both for the continuous improvement initiatives and for the organizational transformation of the purchasing function (Tchokogué and Merminod, 2021).

The literature contains a number of studies that highlight the important role of the procurement process within the purchasing function in supply chain management. However, the research contributions that focus on the purchasing function in the digital economy are extremely limited (Mogre *et al.* (2017; Ocicka, 2021). Although it has been widely stated that in the information age, the purchasing function will see its corporate price grow as an innovation "catalyst" (Ocicka, 2021; Jerome *et al.* (2022), the critical role of the purchasing leaders' behaviors has not, to date, been sufficiently examined. Therefore, this study provides two main research implications.

First, based on the literature review, previous research initiatives which explain the impact of the purchasing leaders' behaviors on the digitalization of the purchasing process appear to be very much in its infancy, hence the need for more studies in this direction. As the first step toward this direction, Svensson and Wood (2005) and Tchokogué and Merminod (2021) show a correlation between the purchasing leadership effectiveness and the purchasing function's performance. Based on previous research, our study shows that the effectiveness of the purchasing leadership is relationship-oriented and contextual dependent. We build on these studies by developing a conceptual model that simultaneously considers different aspects of the purchasing leadership effectiveness through the purchasing leadership behaviors, the contextual factors, and the quality of the hierarchical type of relationships between the purchasing leaders and their subordinates or other employees. This integrative model sheds great light on the central role that the purchasing leaders' behaviors can play in the digitalization of the purchasing function, but also presents

three research proposals that were formulated, which could serve as foundation towards a wider implementation for developing empirical theoretical feedback loops.

Second, from a theoretical perspective, almost none of the existing research grounds their arguments on relevant theories that are widely used in the leadership management literature. For instance, few studies focusing on the effectiveness of the purchasing leadership consider the input of the "go-to-theories" such as the contingency theory or LMX theory. Hence, one of this study's main contributions is to show how some important management theories such as the LMX and the contingency theories can be extended to other research initiatives and serve as input to other theories. It is the case for the model presented in this study where previous theories had been used to enrich the reader's understanding of a current research topic, namely the critical role that a purchasing leadership can play in adopting and deploying some emerging technologies such as Procurement 4.0. Through the lens of these important theories, we have shown that the leadership behaviors exhibited by the purchasing leaders can strengthen the role of a purchasing department and make it a valuable function in the organization. Through their leadership behaviors, the purchasing managers can provide an organization with the first-mover advantage by adopting Procurement 4.0, rather than being "just" a fast follower (Bienhaus and Haddud, 2018).

IMPLICATIONS FOR PRACTICES AND CONCLUSION

Besides the contribution mentioned above, we believe our study also has two main implications for managers struggling to comprehend the factors that facilitate the adoption of Procurement 4.0. First, our study highlights the behaviors and the contextual factors that determine the effectiveness of the purchasing leaders, thus providing valuable information to the purchasing managers. These managers can now easily measure the efforts required to successfully implement Procurement 4.0 in their company. Of course, there is a common agreement that the CPO can take a leadership role and engage the employees of various business functions in a decision-making process regarding the adoption of Procurement 4.0 (Harland *et al. (*2021; Polk, 2022; Addicoat *et al. (*2023; Bartolini, 2023). However, the question of how the CPOs can perform this task has not been examined. Our study therefore provides great benefits to these managers.

We should note that in their study, Bienhaus and Haddud (2018) outline a number of reasons why some organizations are not ready for the digitalization of their purchasing function. They specify three main points: (a) not all organizations have understood the revolutionary impact of information system on the organization, and their supply management systems are not aligned with the digitalization of the purchasing processes; (b) there is a missing digital strategy which could help the organization get a clear picture of the impact for every single department based on the overall organization vision and mission; (c) the employees within the purchasing department do not have the appropriate resources, capacities, as well as capabilities to adapt to change that the digital transformation brings to the table. Hence, the need for the effectiveness outcome from the purchasing leadership initiative could enable companies to fully benefit from the emerging technologies adoption. We contend that the purchasing leaders must take a proactive role in creating and implementing a company's digital strategy that has the potential to independently shape their position as critical resources in the organization.

Second, although the opinions are mixed regarding the success of Procurement 4.0 adoption, our study suggests that each company should adopt its own digital purchasing strategy depending on the company's goals and mission. This implies that each company should have purchasing leaders who can help cope with the challenges of the business landscape and seize the opportunities that come with advanced purchasing management.

The Covid-19 pandemic has exposed the vulnerability of many supply chains (Harland *et al. (*2021) and has reinforced the believe that each purchasing leaders is responsible for: (1) strategically planning and building the purchasing capabilities that address the concern of most critical stakeholders; (2) updating the purchasing roles and policies, rewards and recognition programs, and the buyers' mindset to create the conditions for strategic focus. In this regard, our study suggests that effective purchasing leaders have competencies needed to develop the capabilities required to support the organization's vision and mission from a more strategic and innovative point of view.

In sum, this study builds on previous research by specifically examining how the leadership behavior shapes the effectiveness of the purchasing leader initiatives in the context of Procurement 4.0. To cope with the business pressures which characterize the global economy such as the market, technology, and societal pressures, the purchasing leaders should be valuable personnel with integrated knowledge and skills to be able to adapt to technology innovation and strong competition. As organizations navigate the complexities of the modern business landscape, the role of the purchasing leaders becomes increasingly vital in shaping the future and sustaining the enterprise's competitive advantage. In the specific case of digitalization of the purchasing function, the purchasing leaders should: (1) consider their leadership behaviors as an essential variable; and (2) define a common mindset and attitude towards this digital transformation initiative. Thus, our suggestion that a combination of a strategic vision, relationship building, ethical decision-making, adaptability, and a commitment to continuous improvement characterizes an effective purchasing leadership. These behaviors are interconnected and form the foundation for successful purchasing strategies.

Of course, this study has certain limitations that must be acknowledged, mainly from the model's conceptual nature and the lack of data to empirical test our model.

As a first step towards a wider implementation, further research initiatives can develop an empirical piece that could be used to test our model. As the review of previous studies showed, the literature contains many theoretical models, with very few empirical works.

Second, this study is not industry-specific. One research avenue could apply our models to a specific industry case, such as the electronics industry and focus on smaller firms. We argue that industries that have similar characteristics may be able to benefit from these results. In addition, some industries tend to be or have complex supply chains or products. Testing our model in these types of business environments would show empirically how purchasing leadership effectiveness should be a driving force behind the digitization of the procurement function.

REFERENCES

Addicoat, A., Flynn, R., Kilpatrick, J., Brown, J., & Mitchell, P. (2023). *2023 Global Chief Procurement Officer Survey - Orchestrators of value.* Deloitte.

Agi, M., Ballot, F., & Molet, H. (2005). "100% EDI-connected suppliers" projects: An empirical investigation of success factors. *Journal of Purchasing and Supply Management*, *11*(2–3), 107–115.

Allen, A. (2019). *Buyers spend third of time on manual processes*. Retrieved February 18, 2022, from https://www.cips.org/supply.management/news/2019/september/buyers-spend-third-of-time-on-manual-processes/

Althabatah, A., Yaqot, M., Menezes, B., & Kerbache, L. (2023). Transformative Procurement Trends: Integrating Industry 4.0 Technologies for Enhanced Procurement Processes. *Logistics*, *7*(3), 63.

Anaya, L., Dulaimi, M., & Abdallah, S. (2015). An investigation into the role of enterprise information systems in enabling business innovation. *Business Process Management Journal*, *21*(4), 771–790.

Anderson, M.G., Katz, P.B. (1998). Strategic sourcing. *International Journal of Logistics Management*, *9*(1), 1–13.

Andrzej Krzysztof, K., Baczyńska, A.K., Skoczeń, I., & Korzynski, P. (2022). Towards leadership effectiveness: The role of leadership individual competencies and constraints. Introduction of the Bounded Leadership Model. *Leadership & Organization Development Journal*, *43*(4), 596–611.

Bag, S., Wood, L.C., Mangla, S.K., & Luthra, S. (2020). Procurement 4.0 and its implications on business process performance in a circular economy. *Resources, Conservation and Recycling*, *152*, 104502.

Bartolini, A. (2023). *CPO rising 2023: CPO at the crossroads*: Ardent Partners.

Batran, A., Erben, A., Schulz, R.,& Sperl, F. (2017). *Procurement 4.0: A survival guide in a digital.* Disruptive World. Campus, Frankfurt.

Barua, A., Konana, P., Whinston, A.B., & Yin, F. (2004). An empirical investigation of netenabled business value. *MIS Quarterly*, *28*(4), 585–620.

Bhakoo, V., & Choi, T. (2013). The iron cage exposed institutional pressures and heterogeneity across the healthcare supply chain. *Journal of Operations Management*, *31*(6), 432–449.

Brandon-Jones, A., & Kauppi, K. (2018). Examining the antecedents of the technology acceptance model within e-procurement. *International Journal of Operations and Production Management*, *38*(1), 22–42.

Berson, Y., Nemanich, L.A., Waldman, D.A., Galvin, B.M., & Keller, R.T. (2006). Leadership and organizational learning: A multiple levels perspective. *The Leadership Quarterly*, *17*(6), 577–594.

Beske-Janssen, P., Johnsen, T., Constant, F., & Wieland, A. (2023). New competences enhancing Procurement's contribution to innovation and sustainability. *Journal of Purchasing and Supply Management*, *100847*.

Bienhaus, F., & Haddud, A. (2018). Procurement 4.0: Factors influencing the digitisation of procurement and supply chains. *Business Process Management Journal*, *24*(4), 965–984.

Blome, C., Foerstl, K., & Schleper, M.C. (2017). Antecedents of green supplier championing and greenwashing: An empirical study on leadership and ethical incentives. *Journal of Cleaner Production*, *152*, 339–350.

Bruque-Camara, S., Moyano-Fuentes, J., Maqueira-Marin, J.M. (2016). Supply chain integration through community cloud: Effects on operational performance. *Journal of Purchasing and Supply Management*, *19*(3), 134–143.

Camarero Izquierdo, C., Garrido Samaniego, M.J., & San José Cabezudo, R. (2015). How Strategic Purchasing Orientation and Transformational Leadership Impact Performance: The Mediating Role of Information and Communication Technologies. *Journal of Business-to-Business Marketing*, *22*(4), 269–292.

Carr, A.S., & Pearson, J.N. (2002). The impact of purchasing and supplier involvement on strategic purchasing and its impact on firm's performance. *International Journal of Operations & Production Management*, *22*(9/10), 1032–1053.

Carter, C.R., & Jennings, M.M. (2004). The role of purchasing in corporate social responsibility: A structural equation analysis. *Journal of Business Logistics*, *25*(1), 145–186.

Carter, P.L., Monczka, R.M., Ragatz, G.L., & Jennings, P.L. (2009). *Supply chain integration: Challenges and good practices*. Tempe, AZ: CAPS Research.

Chen, D.Q., Preston, D.S., Swink, M. (2016). How the use of big data analytics affects value creation in supply chain management. *Journal of Management Information Systems*, *32*(4), 4–39.

Close, K., Grebe, M., Anderson, P., Khurana, V., Franke, M.-R., & Kalthof, R. (2020). *The digital path to business resilience*: Boston Consulting Group.

Cortes, A.F., & Herrmann, P. (2021). Strategic Leadership of Innovation: A Framework for Future Research. *International Journal of Management Reviews*, *23*(2), 224–243.

Cousins, P.D., Lawson, B., & Squire, B. (2006). An empirical taxonomy of purchasing functions. *International Journal of Operations & Production Management*, *26*(7), 775–794.

Cullinane, K., & Toy, N. (2000). Identifying influential attributes in freight route/mode choice decisions: A content analysis. *Transportation Research Part E: Logistics and Transportation Review*, *36*(1), 41–53.

Defee, C.C., Esper, T., & Mollenkopf, D. (2009). Leveraging closed-loop orientation and leadership for environmental sustainability. *Supply Chain Management*, *14*(2), 87–98.

Driedonks, B.A., Gevers, J.M.P., & van Weele, A.J. (2010). Managing sourcing team effectiveness: The need for a team perspective in purchasing organizations. *Journal of Purchasing and Supply Management*, *16*(2), 109–117.

Durach, C.F., Kembro, J., & Wieland, A. (2017). A new paradigm for systematic literature reviews in supply chain management. *Journal of Supply Chain Management*, *53*(4), 67–85.

Eisenberger, R., Stinglhamber, F., Becker, T.E., Karagonlar, G., Neves, P., Gonzalez-Moral, M.G., & Steiger-Mueller, M. (2010). Leader-Member Exchange and Affective Organizational Commitment: The Contribution of Supervisor's Organizational Embodiment. *Journal of Applied Psychology*, *95*(6), 1085–1103.

Ellinger, A.E., Lynch, D.F., Andzulis, J.K., & Smith, R.J. (2003). B-to-B e-commerce: A content analytical assessment of motor carrier websites. *Journal of Business Logistics*, *24*(1), 199–220.

Ellram, L.M., Harland, C.M., van Weele, A., Essig, M., Johnsen, T., Nassimbeni, G., . . . Wynstra, F. 2020. Purchasing and supply management's identity: Crisis? What crisis? *Journal of Purchasing and Supply Management*, *26*(1), 100583.

Etse, D., McMurray, A., & Nuttawuth, M. (2022). The Effect of Regulation on Sustainable Procurement: Organisational Leadership and Culture as Mediators. *Journal of Business Ethics*, *177*(2), 305–325.

Fredendall, L.D., Hopkins, C.D., & Bhonsle, A. (2005). Purchasing's Internal Service Performance: Critical External and Internal Determinants. *Journal of Supply Chain Management*, *41*(2), 26–38.

Glas, A.H., & Kleemann, F.C. (2016). The Impact of Industry 4.0 on Procurement and Supply Management: A Conceptual and Qualitative Analysis. *International Journal of Business and Management Invention*, *5*(6), 55–66.

Geissbauer, R., Weissbarth, R., & Wetztein, J. (2016). *Procurement 4.0: Are you ready for the digital revolution?* United States: Strategy & PwC.

Giunipero, L.C., Handfield, R.B., & Eltantawy, R. (2006). Supply management's evolution: Key skill sets for the supply manager of the future. *International Journal of Operations & Production Management*, *26*(7), 822–844.

Giunipero, L.C., & Pearcy, D.H. (2000). World-class purchasing skills: An empirical investigation. *Journal of Supply Chain Management*, *36*(4), 4–13.

Gottge, S., Menzel, T., & Forslund, H. (2020). Industry 4.0 technologies in the purchasing process. *Industrial Management & Data Systems*, *120*(4), 730–748.

Gupta, S., Drave, V.A., Dwivedi, Y.K., Baabdullah, A.M., & Ismagilova, E. (2020). Achieving superior organizational performance via big data predictive analytics: A dynamic capability view. *Industrial Marketing Management*, *90*, 581–592.

Guthrie, J., Petty, R., Yongvanich, K., & Ricceri, F. (2004). Using content analysis as a research method to inquire into intellectual capital reporting. *Journal of Intellectual Capital*, *5*(2), 282–293.

Hallikas, J., Immonen, M., & Brax, S. (2021). Digitalizing procurement: the impact of data analytics on supply chain performance. *Supply Chain Management*, *26*(5), 629–646.

Handfield, R., Jeong, S., & Choi, T. (2019). Emerging procurement technology: Data analytics and cognitive analytics. *International Journal of Physical Distribution & Logistics Management*, *49*(10), 972–1002.

Harland, C.M., Knight, L., Patrucco, A.S., Lynch, J., Telgen, J., Peters, E., . . . Ferk, P. (2021). Practitioners' learning about healthcare supply chain management in the COVID-19 pandemic: A public procurement perspective. *International Journal of Operations & Production Management*, *41*(13), 178–189.

Hawkins, T.G., Gravier, M.J., & Powley, E.H. (2011). Public Versus Private Sector Procurement Ethics and Strategy: What Each Sector can Learn from the Other. *Journal of Business Ethics*, *103*(4), 567–586.

Ho, Y.-h., & Lin, C.-y. (2016). The Moral Judgment Relationship Between Leaders and Followers: A Comparative Study Across the Taiwan Strait. *Journal of Business Ethics*, *134*(2), 299–310.

Hughes, J., & Ertel, D. (2016). The reinvention of procurement. *Supply Chain Management Review*, *20*(3), 18–23.

Hult, G.T.M., Ferrell, O.C., Hurley, R.F., & Giunipero, L.C. (2000). Leadership and Relationship Commitment: A Focus on the Supplier–Buyer–User Linkage. *Industrial Marketing Management*, *29*(2), 111–119.

Hult, G.T.M., Ferrell, O.C., & Schul, P.L. (1998). The effect of global leadership on purchasing process outcomes. *European Journal of Marketing*, *32*(11/12), 1029–1050.

Hult, G.T.M., & Nichols, E.L., Jr. (1999). A study of team orientation in global purchasing. *The Journal of Business & Industrial Marketing*, *14*(3), 194–210.

Hult, G.T.M., Hurley, R.F., Giunipero, L.C., & Nichols, E.L. (2000). Organizational Learning in Global Purchasing: A Model and Test of Internal Users and Corporate Buyers. *Decision Sciences*, *31*(2), 293–325.

Jahani, N., Sepehri, A., Vandchali, H.R., & Tirkolaee, E.B. (2021). Application of Industry 4.0 in the Procurement Processes of Supply Chains: A Systematic Literature Review. *Sustainability*, *13*(14), 7520.

Johnson, P.F., & Leenders, M.R. (2009). Changes in supply leadership. *Journal of Purchasing and Supply Management*, *15*(1), 51–62.

Johnson, P.F., Leenders, M.R., & Fearon, H.E. (1999). The chief purchasing officer: Previous background and experience. *European Journal of Purchasing & Supply Management*, *5*(2), 95–101.

Jerome, J.J., Saxena, D., Sonwaney, V., & Foropon, C. (2022). Procurement 4.0 to the rescue: Catalysing its adoption by modelling the challenges. *Benchmarking: An International Journal*, *29*(1), 217–254.

Karttunen, E. (2018). Purchasing and supply management skills revisited: an extensive literature review. *Benchmarking*, *25*(9), 3906–3934.

Kern, D., Moser, R., Sundaresan, N., & Hartmann, E. (2011). Purchasing Competence: A Stakeholder-Based Framework for Chief Purchasing Officers. *Journal of Business Logistics*, *32*(2), 122–138.

Kerr, S., Schriesheim, C.A., Murphy, C.J., & Stogdill, R.M. (1974). Toward a contingency theory of leadership based upon the consideration and initiating structure literature. *Organizational Behavior and Human Performance*, *12*(1), 62–82.

Knight, L., Tu, Y.-H., & Preston, J. (2014). Integrating skills profiling and purchasing portfolio management: An opportunity for building purchasing capability. *International Journal of Production Economics*, *147*, *Part B*(0), 271–283.

Kolbe, R.H., & Burnett, M.S. (1991). Content-analysis research: An examination of applications with directives for Improving research reliability and objectivity. *Journal of Consumer Research*, *18*(2), 243–250.

Kolchin, M., & Giunipero, L.C. (1993). *Purchasing Education and Training*. Tempe, AZ: Center for Advanced Purchasing Studies.

Kosmol, T., Reimann, F., & Kaufmann, L. (2019). You'll never walk alone: Why we need a supply chain practice view on digital procurement. *Journal of Purchasing and Supply Management*, *25*(4), 100553.

Křenková, E., Rieser, K., & Sato, A. (2021). How software robots can facilitate the procurement process? A case study of Siemens in the Czech Republic. *Entrepreneurial Business and Economics Review*, *9*(3), 191–203.

Kros, J.F., Richey, R.G., Chen, H., & Nadler, S,S. (2011). Technologies emergence between mandate and acceptance: An exploratory examination of RFID. *International Journal of Physical Distribution & Logistics Management*, *41*(7), 697–716.

Kull, T., Wiengarten, F., Power, D., & Shah, P. (2019). Acting as Expected: Global Leadership Preferences and the Pursuit of an Integrated Supply Chain. *Journal of Supply Chain Management*, *55*(3), 24–44.

Lam, M., O'Donnell, M., & Robertson, D. (2015). Achieving employee commitment for continuous improvement initiatives. *International Journal of Operations & Production Management*, *35*(2), 201–215.

Legenvre, H., Henke, M., & Ruile, H. (2020). Making sense of the impact of the internet of things on Purchasing and Supply Management: A tension perspective. *Journal of Purchasing and Supply Management*, *26*(1), 100596.

Lorentz, H., Aminoff, A., Kaipia, R., & Jagjit Singh, S. (2021). Structuring the phenomenon of procurement digitalization: Contexts, interventions and mechanisms. *International Journal of Operations & Production Management*, *41*(2), 157–192.

Luzzini, D., & Ronchi, S. (2011). Organizing the purchasing department for innovation. *Operations Management Research*, *4*(1–2), 14–27.

Luzzini, D., & Ronchi, S. (2016). Cinderella purchasing transformation: Linking purchasing status to purchasing practices and business performance. *Production Planning & Control*, *27*(10), 787–796.

MacManus, S.A. (2002). Understanding the incremental nature of e-procurement implementation at the state and local levels. *Journal of Public Procurement*, *2*(1), 5–28.

Maehraein, V., Visintin, F., & Pittino, D. (2023). The dark side of leadership: A systematic review of creativity and innovation. *International Journal of Management Reviews*, pp. 1–28.

Mishra, A.N., Konana, P., & Barua, A. (2007). Antecedents and consequences of Internet use in procurement: An empirical investigation of U.S. manufacturing firms. *Information System Resources*, (1), 103–120.

Miyazaki, A.D., Phillips, J.K., & Phillips, D.M. (1999). Twenty years of JBL: An analysis of published research. *Journal of Business Logistics*, *20*(2), 1–19.

Mogre, R., Lindgreen, A., & Hingley, M. (2017). Tracing the evolution of purchasing research: Future trends and directions for purchasing practices. *Journal of Business & Industrial Marketing*, *32*(2), 251–257.

Nurmandi, A., & Kim, S. (2015). Making e-procurement work in a decentralized procurement system: A comparison of three Indonesian cities. *The International Journal of Public Sector Management*, *28*(3), 198–220.

Ocicka, B. (2021). How a digital platforms the value proposition in purchasing and buyer-supplier relationship management. *European Research Studies Journal*, *24*(4), 44–56.

Osmonbekov, T., & Johnston, W.J. (2018). Adoption of the Internet of Things technologies in business procurement: impact on organizational buying behavior. *The Journal of Business & Industrial Marketing*, *33*(6), 781–791.

Patrucco, A.S., Luzzini, D., & Ronchi, S. (2017). Achieving innovation through supplier collaboration: The role of the purchasing interface. *Business Process Management Journal*, *23*(6), 1270–1289.

Peters, L.H., Hartke, D.D., & Pohlmann, J.T. (1985). Fiedler's Contingency Theory of Leadership: An application of the meta-analysis procedures of Schmidt and Hunter. *Psychological Bulletin*, *97*(2), 274–285.

Polk, R. (2022). *Sustainable profit: evolving the value proposition of procurement*. Retrieved from https://www.gartner.com/document/4011919?ref=TrackRecommendedEmail:Gartner

Potter, A., & Paulraj, A. (2020). Building supplier innovation triads. *International Journal of Operations & Production Management*, *40*(2), 144–172.

Răzvan-Andrei, C., Ovidiu-Iulian, B., & Daniel-Constantin, J. (2023). The Effects of Strategic Procurement 4.0 Performance on Organizational Competitiveness in the Circular Economy. *Logistics*, *7*(1), 13.

Richey, R.G., Daugherty, P.J., & Roath, A.S. (2007). Firm technological readiness and complementarity: Capabilities impacting logistics service competency and performance. *Journal of Business Logistics*, *28*(1), 195–228.

Saldanha, J., Mello, J.E., Knemeyer, A.M., & Vijayaraghavan, T.A.S. (2015. Implementing supply chain technologies in emerging markets: An institutional theory perspective. *Journal of Supply Chain Management*, *51*(1), 5–26.

Samimi, M., Cortes, A.F., Anderson, M.H., & Herrmann, P. (2022). What is strategic leadership? Developing a framework for future research. *The Leadership Quarterly*, *33*(3), 101353.

Schneider, L., & Wallenburg, C.M. (2013). 50 Years of research on organizing the purchasing function: Do we need any more? *Journal of Purchasing and Supply Management*, *19*(3), 144–164.

Scheuing, E. (1998). The leadership leap. *Supply Management*, *3*(4), 34–35.

Schreiber, B., Janssen, R., Weaver, S., & Peintner, S. (2016). *Procurement 4.0 in the digital world. Transforming procurement into agile, linked innovation leader and catalyst.* Arthur D. Little.

Seuring, S., & Gold, S. (2012). Conducting content-analysis based literature reviews in supply chain management. *Supply Chain Management*, *17*(5), 544–555.

Seyedghorban, Z., Samson, D., & Tahernejad, H. (2020). Digitalization opportunities for the procurement function: Pathways to maturity. *International Journal of Operations & Production Management*, *40*(11), 1685–1693.

Smeltzer, L.R. (1998). Executive and purchasing leadership in purchasing change initiatives. *International Journal of Purchasing and Materials Management*, *34*(4), 12–20.

Spens, K.M., & Kovács, G. (2006). A content analysis of research approaches in logistics research. *International Journal of Physical Distribution & Logistics Management*, *36*(5), 374–390.

Stek, K., & Schiele, H. (2021). How to train supply managers – Necessary and sufficient purchasing skills leading to success. *Journal of Purchasing and Supply Management*, *27*(4), 100700.

Svensson, G., & Wood, G. (2005). The serendipity of leadership effectiveness in management and business practices. *Management Decision*, *43*(7/8), 1001–1009.

Tassabehji, R., & Moorhouse, A. (2008). The changing role of procurement: Developing professional effectiveness. *Journal of Purchasing and Supply Management*, *14*(1), 55–68.

Tchokogué, A., & Merminod, N. (2021). The purchasing department's leadership role in developing and maintaining a preferred customer status. *Journal of Purchasing and Supply Management*, *27*(2), 100686.

Tchokogué, A., Paché, G., Nollet, J., & Stoleru, R.-M. (2017). Intra-organizational legitimization strategies used by purchasing managers. *Journal of Purchasing and Supply Management*, *23*(3), 163–175.

Tellefsen, T. (2006). Antecedents and Consequences of Buying Center Leadership: An Emergent Perspective. *Journal of Business-to-Business Marketing*, *13*(1), 53–82.

Tony, C.T.C., & Kwai-Sang, C. (2007). Key success factors of strategic sourcing: An empirical study of the Hong Kong toy industry. *Industrial Management & Data Systems*, *107*(9), 1391–1416.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, *14*(3), 207–222.

Trent, R.J. (1996). Understanding and evaluating cross-functional sourcing team leadership. *International Journal of Purchasing and Materials Management*, *32*(4), 29–36.

Tripathi, S., & Gupta, M. (2021). A framework for procurement process re-engineering in Industry 4.0. *Business Process Management Journal*, *27*(2), 439–458.

Umbenhauer, B., Ordonez, X., Younger, L., & O'Connor, J. (2017). *The future of procurement in the age of digital supply networks*. Deloitte.

Umbenhauer, B., & Younger, L. (2018). *Leadership: Driving innovation and delivering impact - The Deloitte Global Chief Procurement Officer Survey 2018*. Deloitte.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, *28*(2), 118–144.

Walter, F., & Bruch, H. (2010). Structural impacts on the occurrence and effectiveness of transformational leadership: An empirical study at the organizational level of analysis. *The Leadership Quarterly*, *21*(5), 765–782.

Waters, D.R. (2013). The role of stewardship in leadership. *Journal of Communication Management*, *17*(4), 324–340.

Wiengarten, F., Fynes, B., Humphreys, P., Chavez, R.C., & McKittrich, A. (2011). Assessing the value creation process of e-business along the supply chain. *Supply Chain Management: International Journal*, *16*(4), 207–219.

Williams, A.J. (1995). Supply Managers for the Twenty-First Century: The Learning Imperative. *International Journal of Purchasing and Materials Management*, *31*(2), 38–42.

Wolf, H.-H. (2005). Making the transition to strategic purchasing. *MIT Sloan Management Review*, *46*(4), 17–21.

Wynstra, F. (2010). What did we do, who did it and did it matter? A review of fifteen volumes of the (European) Journal of Purchasing and Supply Management. *Journal of Purchasing and Supply Management*, *16*(4), 279–292.

Yukl, C. (1998). *Leadership in organization.* Englewood Cliffs, NJ.: Prentice-Hall.

Yukl, G. (2008). How leaders influence organizational effectiveness. *The Leadership Quarterly*, *19*(6), 708–722.

Yukl, G. (2010). *Leadership in Organizations*. Pearson Education.

Yukl, G. (2012). Effective Leadership Behavior: What We Know and What Questions Need More Attention. *Academy of Management Perspectives*, *26*(4), 66–85.