

# Opening the black box of organizational Machiavellianism: is co-innovation coming to an end as a driver of innovation performance?

Driver of  
innovation  
performance

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## Abstract

**Purpose** – The discussion on co-innovation inhibitors usually focuses on external actors' opportunism, related to the loss of intellectual property. However, from the organizational Machiavellianism perspective, inhibitors are not external as the company itself is a source of constraints. Unfortunately, there is a lack of research studies examining the possible negative impact of organizational Machiavellian behavior such as amorality or distrust and desire for control, which could destroy external partners' trust and commitment. This paper aims to analyze the effect of organizational Machiavellianism on the relationship between co-innovation and innovation performance (product and process innovation).

**Design/methodology/approach** – Structural equations were used to test the research model using survey data from a sample of companies located in an emerging country with a high risk of corruption.

**Findings** – Surprisingly, distrust and desire for control do not moderate the relationship between co-innovation and innovation performance, but do have a positive and direct effect on innovation performance. Conversely, amorality has a negative moderating effect on this relationship.

**Originality/value** – The study reveals that amorality is an evident constraint of the positive impact of co-innovation, as it diminishes the amount and quality of external actors' contributions in terms of new ideas and knowledge. In contrast, distrust and desire for control alert the firm about opportunistic behavior by external partners such as technology providers, who may induce the firm to adopt an inadequate technological standard in line with their commercial interests.

**Keywords** Product innovation, Process innovation, Open innovation, Unethical behavior, Collaborative innovation platforms, Low moral intensity setting

**Paper type** Research paper



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## Introduction

Two of the biggest corporate corruption scandals have occurred in the South American continent in the past decade, namely, Petrobras and Odebrecht (Diirr and Cappelli, 2018). Therefore, the fact that the countries in the region, except for Chile and Uruguay, are in a high-risk corruption area is not unwarranted, according to the Transparency International index (Cardenas *et al.*, 2018; Transparency International, 2021). This situation seems to be linked to the characteristic traits of the countries' culture prevailing in the region regarding power distance and uncertainty avoidance (Vitolla *et al.*, 2021). The region occupies intermediate positions in the Global Innovation Index and is lagging behind developed countries (Cornell University, INSEAD and WIPO, 2020), partly because the cultural ties of unethical behavior have a domino effect that negatively affects politics and the economy (Poveda, 2015) since it is reflected on the actions of business organizations and their members – a situation termed “the contagion effect” (Hauser *et al.*, 2020; Serenko and Wei, 2020).

A set of socially aversive traits, referred to as the dark side of personality, namely, narcissism, Machiavellianism and psychopathy (Brownell *et al.*, 2021), is becoming an alternative approach to understanding the link between fraudulent behavior and innovation at the organizational level (Salehi and Moghadam, 2019; Serenko and Wei, 2020; Strobl *et al.*, 2019), assuming that this type of behavior is rooted in said dark side of personality. In particular, Machiavellianism, which is related to unethical behavior (Hauser *et al.*, 2020; Jones and Mueller, 2021), involves a greater tendency to engage in negative behavior such as theft, abuse, revenge, lying and sabotage (De Hoogh *et al.*, 2021; O'Boyle *et al.*, 2012).

With respect to innovation, Machiavellianism may induce the company to challenge or fraudulently change the regulation of the industry where it operates when introducing innovations to the market (Baucus *et al.*, 2008; Nguyen *et al.*, 2016; Zyglidopoulos *et al.*, 2019). Additionally, it induces employees to withhold key knowledge or share misinformation with colleagues as a measure to protect personal interests (Serenko and Wei, 2020), thus affecting idea generation and new product development (Xiong *et al.*, 2021). It can even lead individuals to refrain from warning about possible organizational failures to avoid spending time and energy expressing their concerns (De Clercq *et al.*, 2021). This behavior in particular is highly detrimental when launching a new product or improvement in the market, as the success of product innovation depends to a large extent on leveraging all the existing knowledge in the company (Zapata-Cantu *et al.*, 2020).

Machiavellianism is a social behavior strategy involving the manipulation of others to obtain personal benefits (Christie, 1970) as well as distrusting others and engaging in amoral manipulation (Dahling *et al.*, 2009; Jones and Mueller, 2021). The concept of organizational Machiavellianism was introduced in the past decade, based on the assumption that this phenomenon is tied to a specific context such as the work environment, where individuals feel the need to influence others (Kessler *et al.*, 2010). However, the level of analysis remained strictly on an individual basis because Machiavellianism continues to be regarded as a strategy for achieving individual goals (De Clercq *et al.*, 2021; LeBreton *et al.*, 2018; O'Boyle *et al.*, 2012).

Regarding innovation, Machiavellianism studies have examined its relationship with individual creativity and its effect on technology assessment processes by managers (LeBreton *et al.*, 2018; Strobl *et al.*, 2019). Likewise, other studies have explored the extent to which Machiavellianism dimensions influence the quantity and quality of the ideas that an individual contributes to a collaborative platform (Hutter *et al.*, 2015) and have examined the incidence of behavior classified as Machiavellian, such as corruption, on innovation performance (Nguyen *et al.*, 2016; Wellalage *et al.*, 2020). However, recent studies show

contradictory results, whereas the negative influence of Machiavellianism on the exchange of key knowledge among employees is highlighted (Serenko and Wei, 2020), and its positive influence on market entry with new business ideas has also been stressed (Brownell *et al.*, 2021).

Nevertheless, there is a lack of research studies strictly placing Machiavellianism at the organizational analysis level, that is, those that view Machiavellianism as an organization's tendency to manipulate external actors for achieving organizational goals. For instance, corruption may be regarded as a Machiavellian behavior due to its amoral nature; it is classified as both individual and organizational – the latter occurring when the company is the direct beneficiary of the corrupt activity and when it is carried out by more than two employees (Pinto *et al.*, 2008; Zygildopoulos *et al.*, 2019). In this way, Machiavellianism may also emerge in the context of collaborative work with external actors where the company may be tempted to resort to this strategy for obtaining organizational, economic or reputational benefits, among others, at the expense of its external partners and stakeholders.

Co-innovation is one of these interorganizational phenomena, and it implies the knowledge flow between the company and external actors (Arias-Pérez *et al.*, 2020; Chesbrough and Bogers, 2014; Ghezzi *et al.*, 2020). However, the argument on co-innovation inhibitors is aimed in a different direction, as it is usually focused on external actors' opportunism, related to the loss of intellectual property and reputational damage (Abhari *et al.*, 2018). Thus, there is a lack of research studies examining the possible negative impact of organizational Machiavellian behavior such as amorality, which could destroy external partners' trust and commitment and good reputation among clients. In other words, from the organizational Machiavellianism perspective, inhibitors are not external as the company itself is a source of constraints for the development of co-innovation activities, ultimately impacting key external actors' engagement and slowing down knowledge flow from that external source, which negatively affects innovation performance. Therefore, the aim of this paper is to examine the effect of organizational Machiavellianism on the relationship between co-innovation and innovation performance.

Our study contributes to the debate on Machiavellianism and innovation in several ways. The main academic contribution is that our findings dispute previous research revealing a positive relationship between amorality and innovation results (Nguyen *et al.*, 2016; Wellalage *et al.*, 2020) and show that this trait of Machiavellianism is destructive and an evident constraint of the positive impact of co-innovation on innovation performance. Hence, our primary practical recommendation is to prioritize the adoption of codes of conduct on virtual innovation platforms, aimed at increasing trust among external actors and reducing the risk of opportunistic behavior by stakeholders, including the company.

### Theoretical framework and hypotheses development

According to the knowledge-based view of the firm, the inventory of individual and social knowledge is the most valuable resource of the organization (Grant, 1996) and the main determinant of competitive advantage (Kogut and Zander, 1992). Hence, co-innovation is considered a highly significant organizational skill because of its potential to generate a flow of new knowledge created collaboratively with external partners in innovation platforms, with the purpose of obtaining innovation results superior to those of the competition (Arias-Pérez *et al.*, 2020; Enkel *et al.*, 2020).

In turn, transaction cost theory (TCT), whose core assumption is opportunism, posits that market players behave opportunistically, and such behavior is perceived as self-interest that is sought with guile (Williamson, 1975). Therefore, TCT has been the theoretical lens recognizing the existence of different organizational behavior that have a negative

connotation and slow down or dynamize the flow of knowledge for personal convenience or benefit (Arias-Pérez and Vélez-Jaramillo, 2022). One of them is Machiavellianism (Hutter *et al.*, 2015), deeply rooted in opportunism and the protection of personal (Sakalaki *et al.*, 2009) or organizational interests related to the company's relationship with external actors as proposed in this paper.

#### *Co-innovation and innovation performance*

Open innovation is understood as the innovation process based on the purposive management of knowledge flows beyond organizational limits (Chesbrough and Bogers, 2014). Owing to the rapid growth and spread of social networks, open innovation often occurs in technology platforms that facilitate the convergence and wide participation of various external actors, mainly customers, as well as the consolidation of virtual innovation networks (Canet-Giner *et al.*, 2020; Enkel *et al.*, 2020). For this reason, some authors have coined the term *co-innovation* to refer to open innovation occurring on virtual platforms (Abhari *et al.*, 2017; Arias-Pérez *et al.*, 2020).

Innovation performance refers to the concrete results from product and process innovation (Liao *et al.*, 2007; OECD/Eurostat, 2018; Zapata-Cantu *et al.*, 2020). Co-innovation is a process that helps to improve innovation performance by invigorating the acquisition of knowledge from external sources, as well as its combination with internal knowledge and its application in the development of new and improved products and processes (Abhari *et al.*, 2017; Ghezzi *et al.*, 2020). According to the above, the following hypothesis is posed:

*H1.* Co-innovation positively influences innovation performance.

#### **Organizational Machiavellianism and co-innovation**

Machiavellianism is the tendency to distrust others, to engage in amoral manipulation, to control others and to seek status (Dahling *et al.*, 2009; Jones and Mueller, 2021). However, in the present study, organizational Machiavellianism is viewed as the employees' tendency to distrust and control external actors with whom the company relates, as well as engaging in amoral behavior with the purpose of achieving benefits for the organisation.

The current consensus is that Machiavellianism is not an organizational factor of a strictly negative nature, with the exception of amoral behavior, which has an obvious negative connotation related to a disregard for morality standards and to behavior benefiting the firm at the expense of others (Dahling *et al.*, 2009; De Hoogh *et al.*, 2021). Conversely, distrust of others and the desire for control can have a positive connotation (Kessler *et al.*, 2010). The first one alludes to a cynical outlook on the motivations and intentions of external actors with a concern for the negative organizational implications of those intentions, whereas the second one refers to the need to exercise dominance over interorganizational situations to minimize the power of others (Brownell *et al.*, 2021; Dahling *et al.*, 2009; Recendes *et al.*, 2018). Therefore, the incidence of organizational Machiavellianism on co-innovation and innovation performance is marked by the duality of negative and positive effects occurring simultaneously.

Machiavellianism plays a moderating role in the relationship between co-innovation and innovation performance for various reasons. Co-innovation involves a series of different risks for the company: financial, loss of intellectual property, reputational and time-related (Abhari *et al.*, 2018). For example, ideas created collaboratively can be fraudulently exploited by an external ally and failures can seriously affect organizational reputation. Particularly, distrust and the desire to control external actors mean that the company is in a permanent

state of sensitivity and alertness, allowing for an early identification of risks and potential opportunistic behavior by external actors. Hence, it is possible to foresee and adopt mechanisms to neutralize any possible threat (Hutter *et al.*, 2015), for instance, by accelerating the co-innovation time-to-market stages as an informal measure to intellectual property protection (Colombelli *et al.*, 2020).

Furthermore, mistrust and the desire for control are an advantage in terms of managing impressions aimed at generating a favorable opinion before others and obtaining their favor (Becker and O'Hair, 2007; Brownell *et al.*, 2021). It has been argued that Machiavellianism involves the display of behavior similar to those of charismatic leadership, such as showing strong self-confidence in times of uncertainty, technical competence and carefully choreographing emotions to elicit strong affective attachment and performance from others (Deluga, 2001; Jones and Mueller, 2021). Furthermore, Machiavellianism is often associated with political skill, whose function is to transmit and manage organizational performance and capabilities (De Clercq *et al.*, 2021; Treadway *et al.*, 2013). These traits play an important role in the co-innovation context, which depends to a large extent on how the company manages its image and reputation in co-innovation environments (Zheng *et al.*, 2018).

Attracting and engaging external actors in co-innovation activities heavily depends on the credibility of the company to successfully complete a project, on the way a new idea or project is persuasively presented and on the efforts to maintain project acceptance through the direct participation of the company's employees and by frequently updating the co-innovation process status (Zheng *et al.*, 2018). For that reason, keeping external actors engaged also requires understanding and satisfying the motivations related to pursuing fun or having an intellectual experience in terms of knowledge sharing and the generation of a learning process (Arias-Pérez *et al.*, 2020).

In summary, distrust of others and the desire for control are key because they allow anticipating external partners' opportunistic behaviors that affect innovation outcomes and taking action to mitigate them (Colombelli *et al.*, 2020; Hutter *et al.*, 2015). Furthermore, this aspect of Machiavellianism allows companies to be more concerned with their relationships with external partners (Becker and O'Hair, 2007; Brownell *et al.*, 2021). Specifically, there is greater concern for understanding and satisfying the motivations of these external stakeholders (Zheng *et al.*, 2018), resulting in increased engagement and participation in co-innovation processes (Arias-Pérez *et al.*, 2020). Thus, the following hypothesis is posed:

- H2.* Organizational Machiavellianism, particularly distrust of others and the desire for control, positively moderates the relationship between co-innovation and innovation performance.

In contrast, the negative aspect of Machiavellianism – amorality – implies a greater tendency to engage in negative behavior such as theft, abuse, revenge, lying and sabotage (Jones and Mueller, 2021; O'Boyle *et al.*, 2012; Recendes *et al.*, 2018) to the detriment of the interests of the external actors who participate in the co-innovation process (Hutter *et al.*, 2015), e.g. misappropriation and fraudulent use of external partners' innovation ideas. These behavior can generate a benefit for the company in the short term (Becker and O'Hair, 2007; Zygildopoulos *et al.*, 2019), usually of an economic nature (Pekdemir and Turan, 2015), but are counterproductive in the long term because they lead to reputational damage resulting from the deterioration of credibility and trust in the company, discouraging external actors' participation and destroying the collaborative climate (Zheng *et al.*, 2018).

As an example of the foregoing, the ideas and contributions of an actor who has engaged in amoral behavior are often negatively assessed and classified as low-quality collaborations (Hutter *et al.*, 2015). Additionally, amorality is contagious and generates a boomerang effect

because external actors begin to adopt similar behavior and act opportunistically (Hauser *et al.*, 2020; Serenko and Wei, 2020), thus increasing co-innovation risks for the company: financial, loss of intellectual property, reputational and time-related (Abhari *et al.*, 2018).

For instance, concealing key knowledge is an opportunistic behavior that external actors may eventually adopt (Serenko and Wei, 2020), as they perceive the amorality of the firm with which they are co-innovating. In other words, Machiavellianism generates a contagion effect on external actors that slows down the flow of knowledge coming from virtual innovation platforms, affecting idea generation and new product development (Xiong *et al.*, 2021). In fact, as Machiavellianism deteriorates the climate of collaboration, external stakeholders may refrain from warning the company about possible organizational failures (De Clercq *et al.*, 2021). This behavior is particularly detrimental when launching a new product in the market or improving internal processes, as the success of product and process innovation depends to a large extent on exploiting all the knowledge available inside (Zapata-Cantu *et al.*, 2020) and outside the firm (Ghezzi *et al.*, 2020).

Furthermore, amorality is related to the tendency to challenge the regulation of the industry where the firm operates when attempting to introduce innovations to the market (Baucus *et al.*, 2008; Nguyen *et al.*, 2016); for instance, Machiavellianism encourages the firm to engage in environmentally irresponsible activities (Myung *et al.*, 2017). Therefore, amorality leads toward appropriation and fraudulent use of external actors' ideas, particularly to improve innovation performance, even if this implies breaking the rules of socio-environmental responsibility. This conduct exposes the firm to reputational damage among customers and society, seriously affecting the acceptance of innovations launched by the firm (Chernev and Blair, 2015; Zyglidopoulos *et al.*, 2019), especially as reputation may sometimes partially replace consumers' own experience with the products (Mu and Zhang, 2021).

In summary, unlike distrust of others and the desire for control, amorality is a negative aspect of Machiavellianism because it increases the risk of the company engaging in unethical behavior during product and process innovation processes (Baucus *et al.*, 2008; Nguyen *et al.*, 2016). This type of corporate behavior triggers opportunistic behaviors from external partners, reducing the frequency and quality of their contributions to co-innovation processes (Hauser *et al.*, 2020; Hutter *et al.*, 2015; Serenko and Wei, 2020). Therefore, the following hypothesis is proposed:

- H3.* Machiavellianism, particularly amorality, negatively moderates the relationship between co-innovation and innovation performance.

## Material and methods

### *Sample and data collection*

The proposed model was tested in a sample of manufacturing and service firms located in Colombia, an emerging country classified as technology follower. The firms in the sample are from low- and medium-technology sectors, namely, manufacture of food products, machinery and equipment, rubber and plastic products, wholesale and retail trade, financial and insurance activities. Fieldwork was conducted between September 2018 and October 2018 through a questionnaire emailed or physically applied to the senior management of a total of 600 firms that voluntarily registered in a mentoring program to develop innovation capabilities. This program was sponsored by an institution from the regional system of innovation. 112 valid responses were obtained, a sample size guaranteeing a satisfactory statistical power above 80% (Hair *et al.*, 2019).

Regarding the respondents' characteristics, 16% of them belong to presidency and general management, 19% to human resources, 16% to marketing, 15% to systems and technology, 9% to research and development, 7% to production and the remaining 18% to other areas such as finance and quality management. In their companies, the respondents have the responsibility to lead innovation processes and to liaise with actors of the regional innovation system.

#### *Measurement scales*

A new scale was employed for measuring co-innovation (Taghizadeh *et al.*, 2016), whereas a well-known scale was used for measuring innovation performance (Liao *et al.*, 2007). For organizational Machiavellianism, a previously-used scale was adapted (Kessler *et al.*, 2010). Besides, a Likert scale ranging from *totally disagree* (1) to *totally agree* (5) was used.

#### *Common method variance*

For avoiding the common method variance (CMV) problem, the Harman's single-factor test was performed, allowing to establish the variance accounted for in the first factor as 37.5%. This result indicates that the likelihood of the CMV problem occurring in the data is extremely low.

#### *Reliability and validity*

The reliability and validity of the measurement model were examined with equations by using the partial least squares structural equation modeling (PLS-SEM) method. Regarding individual reliability, it was verified that all items had a loading equal to or above 0.7 (Table 1). Furthermore, it was verified that all constructs had a Cronbach's alpha, composite reliability (CR) indices and average variance extracted (AVE) greater than 0.5 (Hair *et al.*, 2019).

#### *Discriminant validity*

To establish discriminant validity, it was confirmed that all values of the heterotrait-monotrait (HTMT) correlations were below the threshold of 0.85 (Table 1) (Hair *et al.*, 2019).

#### *Moderating test procedure*

To test the moderating effect, three models were estimated in which the control variables, then the main construct and finally the two moderating variables are gradually incorporated. To do this, PLS-SEM was used to obtain the confidence intervals at 95% and the *t*-values of the coefficients of the different paths from a bootstrapping of 5,000 subsamples (Hair *et al.*, 2019).

## **Results**

According to Model 1 (Table 1), size as control variable has a positive effect on innovation performance ( $\beta = 0.27$ ), whereas Model 2 presents a main effect, owing to the positive influence of co-innovation on innovation performance ( $\beta = 0.59$ ). Therefore, *H1* is accepted. In Model 3, only the existence of a moderating effect of amorality ( $\beta = -0.21$ ) is evidenced, while distrust and desire for control show a positive direct effect on innovation performance ( $\beta = 0.25$ ). Hence, *H2* is accepted but *H3* is rejected. The  $f^2$  value of 0.24 indicates that the strength of the interaction is moderate.

*Reliability and validity*

Constructs	Loadings	HTMT			
		1	2	3	4
1. Co-innovation (CA = 0.94; CR = 0.95; AVE = 0.57; pA = 0.95)					
CO1 – Different communication channels are used to have dialogue with customers	0.71*				
CO2 – Dialogue sessions with customers are frequent	0.78*				
CO3 – Customer experiences with our products or services are recognized	0.75*				
CO4 – Employees' effort to assist individual customers is emphasised	0.74*				
CO5 – Providing experiences to the customers rather than the ownership of products or services is emphasised	0.70*				
CO6 – All the necessary product and service-related information is provided to the customers	0.79*				
CO7 – Customers are informed about the potential risks of the products or services	0.78*				
CO8 – Customers are informed about the limitation of the company's knowledge and capability	0.76*				
CO9 – The changing dynamics of customer needs are recognized	0.81*				
CO10 – Customer complaints about products or services are accepted	0.81*				
CO11 – All product and service-related information is made clear to the customer	0.71*				
CO12 – The company gets benefit from the exchange of information with its customers	0.73*				
CO13 – Trust is built among customers through transparent information	0.78*				
CO14 – Up-to-date information is provided to customers	0.76*				
2. Innovation performance (CA = 0.93; CR = 0.94; AVE = 0.62; pA = 0.94)		0.61			
IP1 – New products and service are often developed which are well accepted by the market	0.75*				
IP2 – Most of the company's profits are generated by the new products and services developed	0.70*				
IP3 – New products or services are often launched faster than our competitors	0.80*				
IP4 – The company has better capability in R&D of new products or services than its competitors	0.83*				
IP5 – Novel skills for transforming old products into new ones for the market are always developed	0.84*				
IP6 – The company often tries different operation procedures to speed up the achievement of its goals	0.79*				
IP7 – The company always acquires new skills or equipment to improve the manufacturing operation or service process	0.80*				
IP8 – The company can develop more efficient manufacturing processes or operation procedures	0.83*				
IP9 – The company can flexibly offer products and services according to the demands of the customers	0.74*				
IP10 – The new manufacturing or operation processes implemented are always imitated by the competitors	0.77*				
3. Machiavellianism – Distrust and desire for control (CA = 0.81; CR = 0.87; AVE = 0.63; pA = 0.83)		0.06	0.32		
Mach-Control1 – When some kind of rivalry arises with external allies, strategic actions should be taken to neutralise them	0.77*				
Mach-Control2 – Employees who collaborate with external allies should take advantage of any situation to maximise the benefit for the company	0.78*				
Mach-Control3 – It is acceptable that employees who collaborate with external allies take advantage of any opportunity to have greater influence over them	0.82*				
Mach-Control4 – Employees who collaborate with external allies should know how to generate a better impression before others and use it for the benefit of the company	0.81*				

(continued)

**Table 1.**  
Reliability, validity  
and results



4. Machiavellianism – Amoralità (CA = 0.94; CR = 0.95; AVE = 0.85; pA = 0.85)				0.12	0.04	0.24
Mach-amor1 – It is tolerable to overlook possible environmental risks arising in the collaborative work with others				0.82*		
Mach-Amor2 – It is tolerable to overlook eventual collateral effects for society arising from the collaborative work with others				0.97*		
Mach-Amor3 – It is tolerable to overlook possible collateral effects for customers arising from the collaborative work				0.97*		
<i>Structural equations results</i>						
Variables	Model 1	Model 2	Model 3			
<i>Control</i>						
Technological intensity	0.07	0.06	–0.04			
Size	0.27*	0.08	0.01			
Age	–0.10	0.02	0.01			
<i>Main effects</i>						
H1: Co-innovation		0.59***	0.51***			
Machiavellianism – Distrust and desire for control			0.25**			
Machiavellianism – amorality			–0.06			
<i>Interaction effects</i>						
H2: Co-innovation × Distrust and desire for control			–0.15			
H3: Co-innovation × Amorality			–0.21**			
F <sup>2</sup>			0.24			
R <sup>2</sup>	0.06	0.37	0.49			

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

Table 1.

## Discussion

The existence of a moderating effect of Machiavellianism, particularly of amorality, means that once the external actors perceive that the firm has engaged in conducts to obtain a benefit to the detriment of their interests, the relationship between co-innovation and innovation performance starts to weaken. This occurs because the amount and quality of external actors' contributions diminish in terms of new ideas and knowledge, two elements that improve product and process innovation indicators. Additionally, customer perception is affected, which deteriorates acceptance of new products in the market.

By contrast, the moderating effect of distrust and desire for control reveals that this aspect of Machiavellianism does not specifically play an important role in the relationship between co-innovation and innovation performance, probably because individuals who participate in co-innovation activities are motivated in an intrinsic way, whether for emotional or intellectual reasons (Arias-Pérez *et al.*, 2020; Ghezzi *et al.*, 2020). Hence, actions oriented to having a greater control over the participants are ineffective in this context; however, they are sensitive to their counterpart's amoral behavior – the firm – in this case. Our findings show that this aspect of Machiavellianism has a direct, positive and significant effect on innovation performance. In other words, distrust and desire for control are key elements in the firm's relations with external partners outside virtual innovation platforms for improving innovation performance.

This is a significant finding for firms located in technology-follower countries, where product and process innovation primarily depends on the acquisition of external knowledge and technology (Arias-Pérez and Vélez-Jaramillo, 2022). In this scenario, external partners are highly likely to act opportunistically. For instance, in the local context, it is common for

technology providers behind the licensing of certain applications, such as enterprise resource planning and customer relationship management, to subtly impose a certain technological standard in line with their commercial interests. In this way, client companies gradually become dependent on a single technology supplier because of the restrictions to achieve integrations with the technology of other suppliers, which conditions and restricts product and process innovation. Therefore, the positive impact of distrust and desire for control on innovation performance indicates that the company must be on constant alert and define in advance which concessions it cannot make regarding technological aspects. In this manner, the company can avoid subordinating its product and process innovation potential to the possibilities of the technological standards imposed by external partners.

## Conclusions

### *Theoretical and practical implications*

The major academic contribution of our study is clarifying how and under what circumstances Machiavellianism has both a positive and a negative influence on innovation. Distrust and desire for control is an aspect of Machiavellianism that plays a positive role when the firm seeks to improve product and process innovation in the context of its relationship with external partners, but outside virtual innovation platforms. This result contributes to resolving the current controversy generated by studies in favor and against this aspect of Machiavellianism. Specifically, our study controverts mainstream research that stresses its negative consequences, such as the slowing down of knowledge exchanges at the intraorganizational level (Serenko and Wei, 2020), while supporting the emerging theoretical stance emphasizing its significance at the moment of entering the market with new business ideas (Brownell *et al.*, 2021). In particular, distrust and desire for control implies that the company must be alert to the opportunistic behavior of its external partners, such as technology suppliers that may induce certain technological paths, implying greater attachment to and dependence on technological standards in line with their commercial interests. This implies eventual restrictions for product and process innovation, as it will be subject to the improvement possibilities of such technological standards.

However, our results reveal another face of Machiavellianism; amorality plays a negative role when seeking to improve product and process innovation based on collaborative work with third parties. Therefore, our work contributes to develop the emergent perspective which has attempted to analyze manifestations of this organizational behavior at the interorganizational level, specifically in the context of the interaction between the company and its external allies on virtual innovation platforms (Arias-Pérez *et al.*, 2020; Hutter *et al.*, 2015). But first and foremost, our work's results contradict previous studies that have identified amorality as having positive impact on organizational performance (Zyglidopoulos *et al.*, 2019), particularly on innovation results (Nguyen *et al.*, 2016; Wellalage *et al.*, 2020). Specifically, our results reveal that amorality is destructive and a clear constraint on the positive impact of collaborative work on product and process innovation in virtual innovation platforms.

Furthermore, our main practical recommendation is to prioritize the adoption of codes of conduct, aimed at increasing trust among external stakeholders and reducing the risk of opportunistic behavior by stakeholders, including the company. This type of codes is common in the company's relationship with its stakeholders and, in general, with external actors with whom it innovates within the framework of formal research and development projects, subject to strict contractual clauses (Colombelli *et al.*, 2020; Schleper and Busse, 2013). However, this type of good practice is rarely or never applied in the context of

collaborative work on virtual innovation platforms (Abhari *et al.*, 2018; Arias-Pérez *et al.*, 2020). Thus, our results suggest that the presence of opportunistic behavior has been underestimated, so these codes are necessary for clarity about how the company will commercially exploit new ideas, the criteria for recognizing a third party's copyrights or intellectual property rights and the penalties for those who incur in unethical behavior.

Another practical recommendation is that the company should prioritize tools to promptly identify eventual scenarios arising from the technological decisions made in collaboration with external partners, in order to enhance its innovation performance. Identifying these technology scenarios would facilitate discovering the opportunism underlying innovation ideas from external partners such as technology providers, who have a clear commercial interest. Furthermore, scenario development enables to map the negative consequences of their eventual implementation, as well as to avoid future reliance on a single technological standard.

#### *Limitations and future research directions*

The main limitation of this work concerns the fact that the results are limited to an emerging country with high levels of corporate corruption (Cardenas Cardenas *et al.*, 2018; Poveda, 2015). Hence, these results could not be generalized to developed countries where there is a safer environment for business owing to the availability of more legislative and institutional tools to prosecute and punish cases of corporate corruption (Solás, 2019), and where observing a code of ethics and business conduct is more common in the business culture (Vitolla *et al.*, 2021). Therefore, it is not surprising that recent evidence indicates that when Machiavellianism occurs in a low moral intensity scenario, it has different repercussions compared to a high moral intensity setting (Dalton, 2021).

Future studies should thus be concerned with analysing the effect of Machiavellianism in a high moral intensity scenario. Our suspicion is that organisational Machiavellianism may have further catastrophic consequences on the relationship between co-innovation and innovation performance. However, the priority of future studies should be the analysis of the consequences of Machiavellianism at the strictly interorganizational level, as most research addresses an intraorganizational perspective. Therefore, it would be of great value to delve deeper into how external partners, rather than employees, react when they perceive that the company acts amorally in the context of virtual innovation platforms. For example, it would be relevant to determine the intensity of their eventual acts of knowledge hiding, sabotage and leakage (Arias-Pérez *et al.*, 2020; Hutter *et al.*, 2015; Serenko and Wei, 2020). Finally, future research should be concerned with establishing the extent to which the adoption of a code of ethics and business conduct can reduce the negative effect of organizational Machiavellianism and increase external partners' trust in the company's intentions.

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