

Do Management Control Systems Promote Ambidextrous Innovation? The Moderating Role of Leadership Style
Les systèmes de contrôle de gestion favorisent-ils l'innovation ambidextre ? Le rôle modérateur du style de leadership
Los sistemas de control de gestión promueven la innovación ambidiestra? El papel moderador del estilo de liderazgo

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Résumé de l'article

Cette étude développe et teste un modèle pour évaluer l'impact d'un système de contrôle de gestion ambidextre, conjuguant contrôle interactif (iMCS) et contrôle diagnostic (dMCS), sur l'innovation ambidextre. Nos résultats, basés sur des données recueillies auprès de 232 seniors managers dans le contexte des entreprises françaises, indiquent que le contrôle de gestion interactif favorise l'innovation exploratoire, tandis que le contrôle de gestion diagnostic a une influence positive et significative sur l'innovation d'exploitation. L'analyse des données a également révélé que le système de contrôle de gestion ambidextre optimise l'innovation ambidextre. En outre, nos résultats montrent que le leadership transformationnel modère la relation entre le contrôle de gestion interactif et l'innovation d'exploration, tandis que le leadership transactionnel modère l'impact du contrôle de gestion diagnostic sur l'innovation d'exploitation. Enfin, nos résultats ont révélé que le leadership ambidextre renforce les liens entre le contrôle de gestion et l'innovation ambidextres.

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El papel moderador del estilo de liderazgo

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ABSTRACT

This study develops and tests a model to assess the impact of the ambidextrous management control that refers to a balance between interactive management control system (iMCS) and diagnostic management control (dMCS) on ambidextrous innovation. Our results, based on data collected from 232 senior managers in the context of French companies, indicate that iMCS promotes exploratory innovation, while dMCS has a positive and significant influence on exploitative innovation. Data analysis revealed also that the ambidextrous MCS conducts to ambidextrous innovation. Furthermore, our results show that transformational leadership moderates the relationship between iMCS and exploratory innovation, while transactional leadership moderates the link between dMCS and exploitative innovation. Finally, our findings revealed that ambidextrous leadership reinforces the link between ambidextrous MCS and ambidextrous innovation.

Keywords: diagnostic management control, interactive management control, innovation ambidexterity, ambidextrous leadership, ambidextrous control

Résumé

Cette étude développe et teste un modèle pour évaluer l'impact d'un système de contrôle de gestion ambidextre, conjuguant contrôle interactif (iMCS) et contrôle diagnostic (dMCS), sur l'innovation ambidextre. Nos résultats, basés sur des données recueillies auprès de 232 seniors managers dans le contexte des entreprises françaises, indiquent que le contrôle de gestion interactif favorise l'innovation exploratoire, tandis que le contrôle de gestion diagnostic a une influence positive et significative sur l'innovation d'exploitation. L'analyse des données a également révélé que le système de contrôle de gestion ambidextre optimise l'innovation ambidextre. En outre, nos résultats montrent que le leadership transformationnel modère la relation entre le contrôle de gestion interactif et l'innovation d'exploration, tandis que le leadership transactionnel modère l'impact du contrôle de gestion diagnostic sur l'innovation d'exploitation. Enfin, nos résultats ont révélé que le leadership ambidextre renforce les liens entre le contrôle de gestion et l'innovation ambidextres.

Mots-Clés : contrôle de gestion diagnostic, contrôle de gestion interactif, innovation ambidextre, leadership ambidextre, contrôle ambidextre

Resumen

Este estudio desarrolla y prueba un modelo para evaluar el impacto del control de gestión ambidiestro que se refiere a un equilibrio entre el sistema de control de gestión interactivo (iMCS) y el control de gestión de diagnóstico (dMCS) en la innovación ambidiestra. Nuestros resultados, basados en datos recopilados de 232 altos directivos en el contexto de empresas francesas, indican que iMCS promueve la innovación exploratoria, mientras que dMCS tiene una influencia positiva y significativa en la innovación explotativa. El análisis de datos reveló también que el MCS ambidiestro conduce a la innovación ambidiestra. Además, nuestros resultados muestran que el liderazgo transformacional modera la relación entre iMCS y la innovación exploratoria, mientras que el liderazgo transaccional modera el vínculo entre dMCS y la innovación explotativa. Finalmente, nuestros hallazgos revelaron que el liderazgo ambidiestro refuerza el vínculo entre MCS ambidiestro y la innovación ambidiestra.

Palabras Clave: control de gestión de diagnóstico, control de gestión interactivo, innovación ambidiestra, liderazgo ambidiestro, control ambidiestro



Firms cope with an environment characterized by a high level of uncertainty and must constantly adapt to the technological development. In this context, a multitude of researchers emphasized the role of innovation as a pillar of firms' performance (Berraies and Bchini, 2019). To innovate, firms have to rely on their existing resources and seek new ones. Indeed, on the one hand, focusing only on exploitation of current skills and knowledge may lead to fostering short-term performance, but does not enable to deal with environmental transformations and may conduct to knowledge obsolescence. On the other hand, focusing only on exploratory activities may enhance firms' flexibility and reactivity and generate improved long-term performance, but it is a risky strategy that requires high financial resources. In this perspective, ambidextrous innovation, namely the ability to balance between exploitative and exploratory innovation, is highlighted today as a determinant of companies' performance (Berraies and Bchini, 2019).

In recent studies, some authors have sought to identify the determinant of ambidextrous innovation, namely the board of directors' characteristics (Oheimichen *et al.*, 2017), the styles of leadership (Berraies and Zine EL Abidine, 2019) and the organic and mechanistic control (Ylinen and Gullkvist, 2014). In particular, some studies have explored the relationship between management control systems (MCS) and innovation (Davila *et al.*, 2009; Henri, 2006). Regarding MCS, Simon's framework has retained the attention of multiple researchers (Bedford, 2015; Ferreira and Otley, 2009; Tessier and Otley, 2012). Simons (1995) presented two approaches of MCS, which underline the idea of opposing forces that need to coexist to achieve effective management control and manage dynamic tensions between negative and positive MCSs (Tessier et Otley, 2012). Among the levers of control that this author has defined, interactive and belief MCSs are conceptualized as positive, whereas negative MCSs integrate diagnostic and boundary MCSs. In this research, we focus on two levels of control, namely interactive MCS (iMCS) and diagnostic MCS (dMCS). dMCS materializes the classic monitoring role of formal control mechanisms and helps to guarantee that the prefixed objectives are achieved and that correction actions are implemented in case of a gap between objectives and results (Sakka *et al.*, 2013). iMCS refers to organic, learning-oriented and proactive use of control and aims to highlight sources of uncertainty by deploying control information, challenge pre-defined action plans and encourage the generation of new ideas and flexibility (Sakka *et al.*, 2013). These two approaches are apparently contradictory. While, dMCS aims to deploy

the pre-set strategies, the iMCS leads to the emergence of new ones. Simons (1995) highlighted the dynamic tension between these two methods of use of MCS. Along with this, numerous researchers enriched the theoretical reflection of Simons and suggested instead that these control levers are complementary (Tessier and Otley, 2012; Widener, 2007). By combining them, companies could reconcile between two opposed forces, namely: (1) the need to innovate, to seek new opportunities and to create new strategies in accordance with environmental changes, and (2) the need to achieve goals based on performance variables' control and to monitor the implementation of intended strategies based on feedback loops (Widener, 2007). Bedford (2015) suggested that iMCSs are likely to be beneficial for exploration, while dMCSs are associated to exploitation. In order to meet these dual purposes, firms may thus integrate these two levels of control in the perspective of an ambidextrous MCS and to foster both exploration and exploitation (Lehmann-Ortega and Naro, 2008).

In this line, we pioneer the investigation of the effect of the ambidextrous MCS which refers to a MCS that balances between dMCS and iMCS on ambidextrous innovation. Indeed, at the best of our knowledge, no research has investigated the links between these variables. Indeed, a multitude of research has explored the relationship between MCS and innovation without differentiating between exploitative and exploratory innovations (Davila *et al.*, 2009; Henri, 2006), however limited emphasis has been placed on the relationship between the use of MCS and these types of innovation. Bedford (2015) highlighted that the simultaneous use of iMCS and dMCS has a positive effect on ambidextrous firms' performance. Other studies drawing on conceptual review (Gschwantner and Hiebl, 2016) or qualitative research method (Faurjaudon and Soulert, 2007) claimed that the mix of iMCS and dMCS may foster ambidextrous innovation. Thus, although some qualitative studies investigated the link between the use of MCS and ambidextrous innovation, there is a need to further investigate the links between these variables in the perspective of a quantitative research that may help to embrace better generalizability of the results.

Moreover, particularly absent from this debate, however, is the leadership style. This is an important omission as the leadership style is a key factor that shapes the senior management's control choices and the manner they use controls to influence the subordinates' innovative behavior (Abernethy *et al.*, 2010).



Thus, it is interesting to investigate how leaders can influence MCS in order to boost exploitative and exploratory innovations and thus ambidextrous innovation. Nguyen *et al.* (2017) acknowledged in particular that the transformational leadership style influences the implementation of formal control systems. Prior studies outlined also that transformational leadership predicts exploratory innovation, while transactional leadership is likely to promote exploitative innovation (Kassotaki, 2016; Su and Baird, 2018). We suggest in this paper that by adopting an ambidextrous leadership style –which is defined as a construct of transformational and transactional leadership (Luo *et al.*, 2018) –, leaders can foster both exploitative and exploratory innovations and even ambidextrous innovation. In this perspective, this research proposes to fill the gap that exists in the literature by exploring the moderating role of transformational and transactional leadership styles in the link between iMCS and dMCS and exploratory and exploitative innovations. We deepen the analysis by pioneering the test of the moderating role of ambidextrous leadership in the relationship between ambidextrous MCS and ambidextrous innovation.

This research is structured as follows. First, we present the literature review on the basis of which we formulate hypotheses and conceive conceptual models. Second, we describe the methodology used in this study. Third, we highlight the results of the empirical study. Then, we provide a discussion of the results generated by data analysis. Finally, we conclude by outlining the theoretical contributions, the managerial implications, the limits and the perspectives of this research.

Theoretical Development

The DMCS and IMCS and Innovation

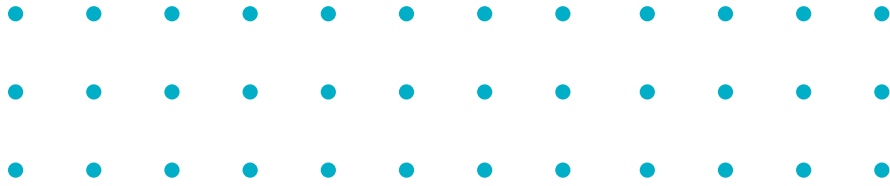
A literature review shows that MCSs have been approached in different manners. Focusing on an overview of MCS studies, Hutzschenreuter (2009) highlighted that the researchers have differentiated between indirect and direct modes of MCS and have focused on some aspects of control system, namely sources, mechanisms, formalization, interfaces, package, object and system-based approaches of control. In this research, we focus on formal MCS, namely the system of control that has been formally used by the managers. In particular, we based our framework on the research of Simons (1995) who provides some

insight concerning the way in which MCS are used. This researcher identifies four controls' levers, namely belief, boundary, interactive and diagnostic controls. As Boundary MCS and Belief MCS are used as tools to “frame the strategy domain” (Biesbe and Otley, 2004, p. 711), the majority of studies have focused on the diagnostic and interactive use of control (Henri, 2006; Widener, 2007) as they “allow a comparison of different controls in terms of the way they are used rather than their technical design characteristics” (Su *et al.*, 2015, p.42). In our research, we do not directly examine the formulation of the strategy domain but focus rather on the modes of uses of MCSs in a manner that facilitates the implementation of intended or emerging strategies. iMCS and dMCS materializes how managers use controls and are attention tools for performance measurement systems (Tessier and Otley, 2012).

The diagnostic use of MCS aims to monitor the outcomes and to ensure that it fulfills the predefined objectives and strategies (Su *et al.*, 2017). It focuses on correcting deviation from expected results and rewarding achievement. According to this approach, strategic performance variables are at the core of managers' concerns who only are interested in employees' activities when there are important deviations between objectives and results (Su *et al.*, 2017). In contrast, the interactive use of MCS refers to a “*formal two-way processes of communication between managers and subordinates at different levels of the organization*” (Mundy, 2010, p. 501). Seen in this light, this level of control fosters initiatives, seeking for new opportunities and share of knowledge among employees operating in the various hierarchical levels, that can challenge current strategies and foster the emergence of new ones (Bisbe and Otley, 2004; Mundy, 2010). By adopting this approach of use of MCS, top managers encourage new ideas and generate discussions, collective intelligence, and continual challenges related to action plans (Henri 2006).

Ferreira and Otley (2009) stressed that firms' key performance factors are controlled by the dMCS that tends to monitor, assess and reward realizations whereas strategic uncertainties are managed by the iMCS that boosts organizational learning and the generation of new ideas and strategies.

Contemporary stream of literature suggested that MCS may lead to innovation under certain contingent conditions. Other researchers stressed that the contribution of control systems to innovation vary depending on whether it is exploitative or exploratory innovation (Davila, 2005).



Bedford (2015) and Ylinen and Gullkvist (2014) outlined the role of iMCS on innovation. In this line, Renaud (2013) proposed that iMCS is likely to encourage knowledge acquisition, thus boosting exploration. Indeed, adopting an interactive form of control involves interaction between organizational members, dynamic learning, collective resolution of problems, sharing of tacit knowledge, and empowering employees to develop new ideas and to seek for new opportunities, which in turn contribute to exploratory innovation. Thanks to iMCS, companies may break with beaten track and routines and explore new ways of doing things. In this context, Simons (2000) confirms that through iMCS, managers stimulate experimentation, initiative and seek new opportunities and new ideas at all levels of the organization. In the same vein, Ylinen and Gullkvist (2014) revealed that the organic control mechanisms which are characterized by high communication, flexibility and participative decision-making boosts generation of new ideas and collective intelligence that positively impact innovativeness in exploratory innovation projects.

Gschwantner and Hiebl (2016) purport that planning control, which is according to them similar to interactive control, may be used for both exploration and exploitation. However, according to McCarthy and Gordon (2011), iMCS aims to foster exploration activities rather than exploitative projects. The iMCS encourages permanent debate, searching for new ideas, interactions and knowledge sharing and involves close working relationships. In addition, on the basis of case studies concerning innovation projects, Chiesa *et al.* (2009) showed that in order to meet the uncertainty characterizing radical projects, managers adopt more intensely iMCS materialized by a high rate of internal meeting aiming to generate ideas all along the product development and commercialization phases. The iMCS stimulates dialogues and allows articulation of emerging strategies in the innovation process (Cruz *et al.*, 2015; Frezatti *et al.* 2017). Moreover, Farjaudon and Soulerot (2007) suggested that the iMCS are especially suited for fostering exploration. Thus, this type of MCS improves the quality of the interaction between employees and the discussion about the existing plans, enhances the organizational learning, supports employees' creativity and innovativeness and fosters the exploration of new opportunities (Farjaudon and Soulerot, 2007; Frezatti *et al.*, 2017; Su and Baird, 2018).

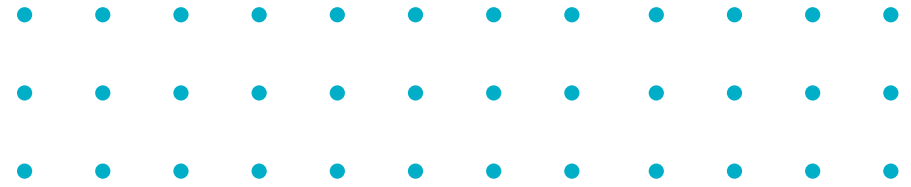
Bedford (2015) suggested that the iMCS challenges the status quo and fosters the search of opportunities, which contribute to boost the exploratory innovation. He outlines the importance of top management for coordinating allocation of resources in order to transform these new opportunities into commercially viable outputs. The iMCS boosts also the sharing of tacit knowledge which is a lever of exploratory innovation (Bedford, 2015). This author added that interactive systems are generally unlikely to be beneficial for exploitation, "where the more routine nature of activities and incremental innovative efforts result in less of an information deficit" (p. 4). This author concluded that compared to dMCS, iMCS involves more managerial attention and is not the key for successful exploitative innovation.

Drawing on the above literature review, we can propose that iMCS is likely to boost exploratory innovation at the detriment of exploitative innovation. Thus, we hypothesize that:

H1. iMCS has a positive effect on exploratory innovation

H2. iMCS has a negative effect on exploitative innovation

Moreover, some previous studies suggested also that dMCS contributes to innovation (Bedford, 2015; Chiesa *et al.*, 2009). While Frezatti *et al.* (2017) found that dMCS is not linked to both radical and incremental innovations, Ylinen and Gullkvist (2014) revealed that the mechanistic type of control associated with dMCS has a positive effect on innovativeness in exploitative innovation projects. Drawing on case studies, Chiesa *et al.* (2009) showed that compared to radical projects' managers, incremental projects' managers rely on formalized MCS and extensively use of quantitative indicators to assess performance. Bedford (2015) suggested also that within exploitative innovation, more emphasis on diagnostic control contributes to performance. This researcher claims in this sense that unproductive discussions emanating from dMCS are likely to enrich exploitative projects rather than exploratory projects. Furthermore, exploitation activities focus on existing knowledge which is mostly explicit in nature (Bedford, 2015). In this sense, the use and share of explicit knowledge boost exploitative innovation rather than explorative innovation (Berraies and Hamouda, 2018). In the same vein, McCarthy and Gordon (2011) purport that dMCS is likely to support the use and improvement of existing knowledge and thus boost exploitation activities. These authors stressed that this type of control is used to direct and



adjust employees' behaviors, which promote single-loop learning, refinement of current practices and thus exploitation and hinder exploration. Similarly, Mundy (2010) argued that the dMCS are especially appropriate for boosting exploitation. Indeed, diagnostic mechanisms aims to reveal problems in deploying intended strategy and therefore urges managers to find solutions and new means by exploiting existing knowledge in order to achieve their goals. Rather than breaking down with routines, diagnostic mechanisms provide feedback about results that may lead to generate solutions aiming to improve routines (Benner and Tushman, 2003).

In addition, dMCS do not provide leeway to employees to experiment new ways of doing things and are centered although on the application of the organizational rules and procedures and the achievement of desired objectives rather than on exploration of new opportunities (Simons, 1995). In the same vein, Henri (2006) revealed a negative effect of the dMCS on organizational learning. Companies adopting mechanistic controls are likely to codify best practices (Jansen *et al.*, 2009), which may encourage the exploitation of existing knowledge and routines and inhibit the generation of new ideas. Yet adopting dMCS focuses on short-term performance management, which involves more exploitation efforts rather than exploration of new opportunities (March, 1991). Farjoudon and Soulerot (2007) suggested also that dMCS boosts exploitation rather than exploration.

Thus, we predict that dMCS may affect positively exploitative innovation and negatively exploratory innovation. Thus, we hypothesize that:

H3. Diagnostic MCS has a negative effect on exploratory innovation

H4. Diagnostic MCS has a positive effect on exploitative innovation

The Effect of Ambidextrous MCS on Ambidextrous Innovation

Firms cope nowadays with a high level of uncertainty in a rapid changing and turbulent environment. A key challenge for these firms is to ensure an adequate balance between exploration and exploitation activities. In this perspective, the notion of ambidexterity has been popularized since the pioneering research of March (1991) who highlighted exploration and exploitation as two types of organizational learning. O'Reilly and Tushman (2013) defined organizational ambidexterity as a firm's capability to both exploit its current skills and knowledge and explore new skills, knowledge and opportunities, and also operate in mature

and new markets in order to boost efficiency and flexibility. Similarly, Lavie *et al.* (2010) stressed the importance for firms to set an adequate mix between exploiting their current knowledge and competencies in order to assure short-term performance and exploring new opportunities and competencies to ensure long-term performance. Gschwantner and Hiebl (2016) emphasized also that firms should balance between implementing exploitative innovation process that is assimilated to incremental innovation and exploratory innovation which is relative to radical innovation. Andriopoulos and Lewis (2009) called for overcoming the tension between these two types of innovation that compete for scarce resource by seeking for ambidextrous innovation.

In the wake of these studies, our research contributes to a better understanding of how firms are likely to effectively pursue simultaneously exploitative and exploratory innovations and thus achieve ambidextrous innovation. Indeed, we consider that to develop and sustain an appropriate balance between exploitation and exploration, the adaptation of MCS can be necessary (Gschwantner and Hiebl, 2016). In this perspective, McCarthy and Gordon (2011) highlighted that MCS boosts both exploration and exploitation in ambidextrous R&D units. Farjoudon and Soulerot (2007) stressed also that MCS is at the heart of the problematic of the ambidexterity. They emphasized that using both iMCS and dMCS may lead to a balance between exploration and exploitation. The coordination and integration of iMCS and dMCS across organizations are key elements in achieving ambidextrous innovation. By conjugating this level of control in a MCS, firms can boost the exploration of new opportunities and the emergence of new strategies thanks to iMCS and exploit current capabilities and knowledge and implement the deliberate strategies through dMCS (Renaud, 2013). The MCS belongs to the structural context that are likely to encourage employees to experiment new ways of doing things and view outside the current deliberate strategy (Davila, 2005). While iMCS allows managers to deal with strategic uncertainties, to avoid the status-quo and to be proactive to the environment changes, dMCS assures the achievement of objectives in an optimal manner (Simons, 1995).

Moreover, several authors pertinently questioned the articulation of these control levers, namely if they are implemented successively or in a parallel way. Indeed, Renaud (2013) refutes the perspective that considers that the levers of MCS are studied as successive phases of the life cycle of the management



control. This author rather conceives that MCS covers a complex reality and that iMCS and dMCS are complementary and are used in parallel as part of an ambidextrous MCS. On the basis of a case study conducted with a French company, she showed that the managers use a single MCS that integrates interactive and diagnostic aspects. Simons (1995) stressed the importance of the simultaneous use of dMCS that promotes the implementation of deliberate strategies and the management of key success factors and iMCS that promotes the emergence of strategies by encouraging learning, interaction and creativity. Hoffman et al. (2012) reported that the diagnostic and interactive uses of budget are complementary. In this line, the use of the 3K Scorecard integrates the features of both interactive and diagnostic control systems and the feedback between double and single-loop learning. On the basis of a case study in a university hospital, Lartigau and Nobre (2011) showed that the MCS used combines between iMCS integrating tools that allow regular and fruitful interactions between organizational members and dMCS integrating the elaboration of budgets and analytical operating result account.

In this perspective, Malmi and Brown (2008) and Grabner and Moers (2013) suggest that researchers have to consider management control as a package to better understand the interdependencies between management control practices, namely how these practices substitute or complement each other in distinct contexts. Conceptualized as a package, management control is “composed of a set of MC systems and/or of a set of independent MC practices addressing unrelated control problems” (Malmi and Brown, 2008, p.408). These authors added that management control practices are considered as a system if they are interdependent and the design choices takes account of these interdependencies. Ferreira and Otley (2009) acknowledged also the importance of the interdependency of MCSs in the same organization. On the basis of a longitudinal study, Tuomela (2005) stressed that strategic performance controls can be used interactively and diagnostically. This researcher acknowledges the interplay between these different uses of MCS and that these uses may evolve and have either diagnostic or interactive roles within different time periods. Tuomela (2005) shows that the dMCS evolves to iMCS and vice versa.

In the same vein, Adler and Borys (1996) proposed an enabling organization in which responsibilities are clarified, creativity is optimized and flexibility is

boosted. Benoit and Chatelain-Ponroy (2016) purport that the ambivalence of the term enabling and the works focusing on capacitive control are in line with diagnostic and interactive systems developed by Simons (1995). These authors suggest that the MCS that is used on the perspective of enabling control encourages interactions between organizational members, employees’ empowerment and implementing of capacitive devices to stimulate innovation. Benoit and Chatelain-Ponroy (2016) stressed also that the model of enabling control of Adler and Borys (1996) is related to the uses of MCSs, allows overcoming the dilemma between efficiency and flexibility. This model is in the same vein of other studies that focused on the ambidextrous use of MCS in order to boost the efficiency and the flexibility of the organizations (Adler and Heckscher, 2013). Lehmann-Ortega and Naro (2008) stressed that ambidextrous control materializes the simultaneous mobilization of different control levers and that refers to the balance between exploitation and exploration. On the basis of a case study on an entrepreneurial organization, these authors emphasized that this firm has implemented an ambidextrous MCS. Bedford (2015) found that the mix of iMCS and dMCS boosts ambidextrous firms’ performance. Thus, the two types of MCS are likely to complement each other and be a structural solution to face the tension that exists between exploitation and exploration (Andriopoulos and Lewis, 2009). Indeed, Bedford (2015) suggested that there are reinforcing effects between these control levers that tend to be complementary in formulation and implementation of strategy. He added that the dynamic tension generated from the simultaneous use of iMCS and dMCS promotes rich and fruitful interactions and debate which lead to opposing demands and viewpoints. In this perspective, instead of searching for tradeoffs between exploitation and exploration or seeking to implement either exploitation or exploration, organizational members are likely to choose alternative solutions by balancing and integration of opposing positions (Bedford, 2015; Henri, 2006). By jointly pursuing iMCS and dMCS and thus adopting an ambidextrous MCS, firms may boost experimentation, prospecting and exploration to adapt to the environmental changes, while simultaneously improve routines activities, exploit existing capabilities and better focus on current activities (Bedford, 2015).

Pešalj *et al.* (2018) stressed that SME can implement multiple control systems to effectively evaluate and manage their performance and to balance long- and short-term objectives, control and creativity and to both focus on the current



strategy and develop new one. In this line, on the one hand, dMCS is used to ensure that things are done as planned, monitor innovation projects and to reward performance or to correct non-conformance or to improve methods, processes or products, which can lead to exploitative innovation. Subordinates are directed and granted to apply and refine current knowledge and skills (McCarthy and Gordon, 2011). On the other hand, iMCS is used to detect valuable knowledge about environmental changes and to respond in proactive manner by integrating this knowledge in forms of new products, services or processes (Simons, 1995). Also, this interactive system integrates the promotion of interaction and discussion between organizational members to explore new ways of doing things (McCarthy and Gordon, 2011).

Based on the above analysis, we consider that firms have to implement ambidextrous MCS in which they balance between iMCS that foster exploration and the emergence of new strategies in order to cope with environmental changes and dMCS that boosts exploitation, implementation and control of deliberate strategies. In this line, this research suggests that firms have to adjust their MCS by ensuring a balance between diagnostic and interactive levels of control to achieve ambidextrous innovation. Thus, we hypothesize that:

H5. Ambidextrous MCS has a positive effect on ambidextrous innovation

Moderator Role of Leadership Styles in the Relationship Between MCS and Innovation

As it was pointed out previously, according to Simons (2000), successful firms are those who articulate iMCS and dMCS to enable both the strategies' formulation and deployment. In this line, some researchers identified a set of contingency variables that influences the use of those levels of control, namely strategy, risk management and environmental uncertainty (Davila *et al.*, 2009). In particular, we focus on the moderating role of leadership in the relationship between MCS and innovation. The topic of leadership has been of increasing interest among academics and practitioners throughout past decades (Kassotaki, 2016). Leadership refers to the ability to influence people and to motivate them to achieve goals and is, in this sense, a social influencing process. The essence of leadership is the leader's vision they articulate and communicate to subordinates, motivating them to achieve an expected performance.

Leaders contribute to the firms' performance by displaying specific leadership behaviors. In particular, Bass (1985) differentiated between two styles of leadership, namely transactional leadership and transformational leadership. Transformational leadership "*occurs when leaders broaden and elevate the interests of their employees, when they generate awareness and acceptance of the purposes and mission of the group and when they stir their employees to look beyond their own self-interest for the good of the group*" (Bass, 1985, p.22). This type of leadership goes beyond the satisfaction of superior needs. In contrast, transactional leadership is founded on relations of exchange, authority, negotiation and reinforcement. For a multitude of researchers, these types of leadership are not mutually exclusive. Kassotaki (2016) stressed that leaders must adopt a right mix between transformational and transactional leadership styles depending on the context. Furthermore, while transformational leaders define high expectations and support their subordinates to reach those expectations, transactional leadership serves to manage subordinates via a reward/punishment system that allows for a better leaders-followers relationship (Bass and Avolio, 1995).

Kassotaki (2016) argued that ambidextrous leaders combine these two leadership styles, which are highlighted as determinants of exploration and exploitation. Indeed, transformational leadership is linked to exploration, while transactional leadership contributes to exploitation (Kassotaki, 2016; Su and Baird, 2018). Jansen *et al.* (2009) found that transformational leadership fosters generative thinking and has a positive effect on exploratory innovation. They also revealed a negative relationship between transactional leadership and exploratory innovation. These researchers emphasized also that while transactional leadership encourages developing and extending existing knowledge, generates incremental improvements to existing products and/or services and promotes exploitative innovation, transformational leadership is not associated with this type of innovation. In a recent study performed in the context of Tunisian knowledge-intensive firms (KIFs), Berraies and Zine El Abidine (2019) pointed out the contribution of ambidextrous leadership, which refers to the interaction between the transactional and transformational leadership styles to innovation ambidexterity. These authors emphasized that in the KIFs, transformational leadership style boosts the entrepreneurial and discretionary behaviors of knowledge workers who value intrinsic motivation factors. This type of leadership intellectually stimulates the fulfillment of higher-order needs of knowledge



workers, inspires them and motivates them to maximize their potential of creativity, try and imagine new ways of doing things, generate original ideas and engage in exploratory activities. In turn, the transactional leader style controls the knowledge workers concerning the use of existing knowledge and the exploitation of current methods to achieve goals, motivates them through rewards and tends to encourage exploitative innovation activities (Berraies and Zine El Abidine, 2019). Bass and Avolio (1995) suggested that transactional and transformational leadership are not mutually exclusive. The use of a right mix of transformational and transactional leadership styles in the sense of an ambidextrous leadership style (Luo *et al.*, 2018), promotes both exploratory innovation and exploitative innovation, boosting thus the ambidextrous innovation, which is the simultaneous pursuit of these two types of innovation.

In addition, some researchers support the idea that leadership style influences MCS (Bobe and Kober, 2018; Doeleman *et al.*, 2012). Nguyen *et al.* (2016) stated that leadership style may affect the strategic priorities and the use of formal control systems of the company. The leadership style of the manager influences the manner in which MCS is used and the response of subordinates to this system. The MCS cannot be effectively used without the influence of an effective leader. The leadership style affects the use of planning and control systems. Leaders keep employees focused and influence them to adhere to the vision and the objectives of the firms and implement them through their tasks, learning and commitment. Jalali *et al.* (2016) stressed that the leadership styles influence the diagnostic and the interactive use of MCS. In particular, Bobe and Kober (2018) purport that the transformational leadership which fosters dissemination of knowledge, interaction, empowerment, cooperation and bottom-up decision making, fits with the aspects of iMCS. It boosts the discussion and exchange of the information generated by iMCS. On the contrary, transactional leadership focuses on efficiency, top-down decision making, standard roles, monitoring, corrective actions' taking and image of consistency (Bobe and Kober, 2018; Jansen, 2008). Moreover, Cruz *et al.* (2015) found that transformational leadership is an antecedent of the iMCS, which in turn contribute to innovation. They also highlighted that the transactional leadership does not affect dMCS. Thus, on the one hand, transformational leaders are visionary, encourages knowledge sharing and creation, participation and creativity and the out of the box thinking, supports the subordinates to perform beyond what is expected of them, and

fosters exploratory innovation at the detriment of exploitative innovation. Cruz *et al.* (2015) added that iMCS involves the search for new opportunities and promotes organizational learning. In this sense, transformational leaders may reinforce the effect of iMCS as it boosts open discussion and reflection, support employees in exploring new ways of doing things and articulates the strategic renewal proposed by the interactive system. On the other hand, transactional leaders may encourage use of existing knowledge, focus on incremental improvement on the basis of a relationship of mutual benefits with their subordinates, and contribute to exploitative innovation rather than exploratory innovation (Kassotaki, 2016). This style of leadership is centered on the fulfillment of contractual obligations and is aligned to the dMCS that monitors and rewards the realization of pre-defined goals and provides feedback and measures based on management by exception and programmed processes (Cruz *et al.*, 2015).

Doeleman *et al.* (2012) stressed that a leadership style that combines transformational and transactional leadership style, moderates the correlations between management control dimensions, namely performance management, management information, management communication, and business excellence. Abernethy *et al.* (2010) investigated the impact of two leadership styles on the control system design. They focused on considerate leadership which can be assimilated to transformational leadership and on leadership style of initiating structure that is similar to transactional leadership. These authors revealed that the two styles of leadership are positively related with the interactive communication use of planning and control systems. In particular, the effect of the initiating structure leadership is less important than the effect of considerate leadership style on planning and control systems. Jansen (2008) purport that if the organizational members have to adjust to incessantly changing targets and criteria, the transformational leadership style can complement the transactional leadership style. Nguyen *et al.* (2018) stressed also that the transformational leadership style build and reinforce the iMCS that boosts interactions, exploration and generate creativity and innovation via suitable performance measures and reward systems, especially in a changing environment. This style of leadership focuses on a reward system that integrates both intrinsic and extrinsic rewards, in order to inspire employees to make extra-efforts and to fit in an optic of continuous improvement. As such, these authors added that transformational leaders boost the exploitation of new opportunities and thus positively influence exploratory

innovation. Transactional leaders focus on the use of planning and control systems as predicted. They “rely on the use of standardized rules and procedures to direct the behavior of subordinates, monitor adherence to standards” (Abernethy *et al.*, 2010) and encourage the exploitation of knowledge and procedures boosting as such exploitative innovation.

On the basis of the above analysis, our research focuses on the moderating role of the transactional and transformational leadership styles in the link between MCS and the two types of innovation. We expect that transformational leadership is likely to be associated with iMCS (Cruz *et al.*, 2015), while transactional leadership is linked to dMCS (Abernethy *et al.* 2010). Moreover, transformational leadership is highlighted by previous researchers as an antecedent of exploratory innovation while transactional leadership is associated to exploitative innovation (Kassotaki, 2016; Su and Baird, 2018). In this perspective, we posit that transformational leadership is likely to reinforce the relationship between iMCS and exploratory innovation and that transactional leadership is likely to strengthen the link between dMCS and exploitative innovation. Moreover, we expect that ambidextrous leadership, which is defined as a right mix of the two styles of leadership (Luo *et al.*, 2018), is likely to reinforce the link between ambidextrous MCS and ambidextrous innovation. From the above, we formulate the following hypotheses:

H6. Transformational leadership positively moderates the relationship between iMCS and exploratory innovation

H7. Transactional leadership positively moderates the relationship between dMCS and exploitative innovation

H8. Ambidextrous leadership positively moderates the relationship between ambidextrous MCS and ambidextrous innovation

In this line, we investigate in this research the impact of the iMCS and dMCS on exploitative and exploratory innovations. We examine also the moderating role of transformational leadership in the link between iMCS and exploratory innovation and the moderating effect of transactional leadership in the relationship between dMCS and exploitative innovation (Figure 1). Furthermore, we deepen the analysis by outlining the contribution of the ambidextrous MCS on ambidextrous innovation and the moderating role of ambidextrous leadership in this link (Figure 2).

FIGURE 1
Effect of iMCS and dMCS on exploitative and exploratory innovations: moderator role of transactional and transformational leadership styles

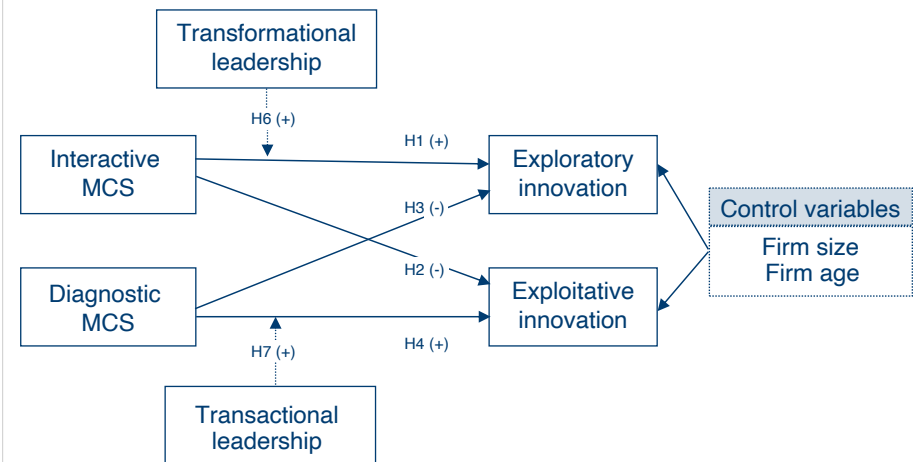
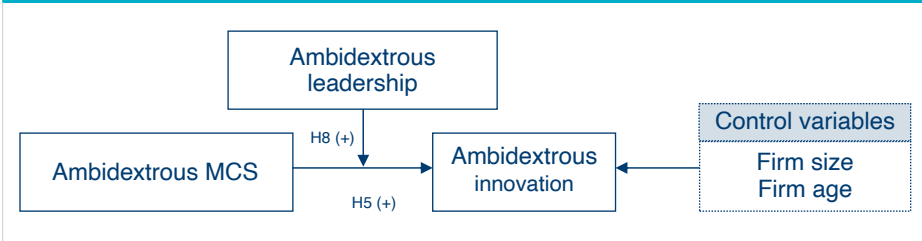


FIGURE 2
The link between ambidextrous MCS and Innovation: moderator role of ambidextrous leadership





Methodology

Sample and Research Design

We tested our hypotheses by conducting a quantitative study in the context of French companies in order to fill the gap in the literature as no quantitative study has neither examined the link between the ambidextrous MCS and ambidextrous innovation nor the moderating role of the ambidextrous leadership in this relationship. We targeted KIFs that tend according to Oehmichen *et al.* (2017) to balance between exploration and exploitation activities. In addition, KIFs constitutes a suitable context for this research as they integrate employees who need a different style of leadership compared to employees working in non-knowledge companies (Donate and de Pablo, 2014). Indeed, compared to manual workers, the knowledge workers tend to be more intrinsically motivated. Cavaliere *et al.* (2015) stressed also that the leadership style is the most important organizational factor that boosts knowledge sharing within KIFs.

In this line, a questionnaire was prepared and pre-tested among 2 researchers and 1 practitioner in the field of management. The pre-test enabled us to test the comprehensibility of the questionnaire. We targeted senior managers who had at least three years of occupancy at their positions. A convenience sampling method was adopted to collect the data, given its advantages in terms of cost saving and time. Thus, the data collection was conducted during three months. 387 questionnaires were distributed in paper and electronic forms, out of which 236 questionnaires were received back, yielding a recovery rate of 60.98%. 4 questionnaires were suppressed due to missing responses. The final sample size is 232 senior managers working in a total of 81 firms. In this line, Kline (2011) recommends no lesser than 5 or 10 questionnaires per parameters. Therefore, the sample size of this research fulfils this criterion. Table 1 presents the respondents' characteristics. Male senior managers accounted for 71.98%. Respondents occupied the function of chief executive officer, senior manager controller, chief operating officer, chief financial officer or senior R&D manager. In addition, all the respondents are highly educated. As for respondents' age, the majority belongs to the 39-54 age bracket and thus to the generation X (45.69%). Also, 26.72% of the respondents belong to the Generation Y and 27.59% integrates the generation of baby-boomers. 85.77% of the respondents have more than 10 years of experience. In terms of sector of activity of surveyed

companies, 35.81% belong to the financial sector, 41.97% integrates the ICT service sector and 22.22% provide other services namely consultancies, advertising and accounting. Most of them are medium companies. Indeed, 25.92% have 10-49 employees, 45.68% have 50-250 employees and 28.40% have more than 250 employees. As for firms' age, 56.79% have more than 10 years of existence compared with 30.86% for 6-10 years and 12.35% cent for 3-5 years.

Variables Measurement

We used validated existing multi-item measurement scales of previous research, in which the responses to items are founded on a five-point Likert scale, ranging from 1=completely disagree to 5=completely agree. We administrated the questionnaire in French. To conceptualize both types of innovation, we used the Jansen *et al.* (2008)'s scale which integrate 7 items for exploratory innovation and 7 items for exploitative innovation. To assess transformational and transactional leadership styles, we used the Multifactor Leadership Questionnaire (MLQ-5x) developed by Bass and Avolio (1995). This scale has been successfully used in a multitude of studies (Afsar *et al.*, 2017; Berraies and Zine El Abidine, 2019; Berraies and Bchini, 2019). This scale incorporates five dimensions of transformational leadership, namely intellectual stimulation (4 items), individualized consideration (4 items), inspirational motivation (4 items), attributed (4 items), and behavioral idealized influence (4 items). It incorporates three dimensions of transactional leadership, namely contingent rewards (4 items), active management by exception (4 items), and passive management by exception (4 items). MCS was captured via Su *et al.* (2017)'s scale which integrates 5 items for the interactive use of controls and 4 items for the diagnostic use of controls. In this line, we invited the respondents to consider only the formal components of these MCSs.

In this research we tested two models. In the first model, we treated (1) exploratory and exploitative innovations, (2) iMCS and dMCS and (3) transformational and transactional leadership styles, as separate variables. In the second model, we ran a model in which each pair of these variables was combined into a single index. Indeed, we measured ambidextrous innovation by the product of exploitative innovation and exploratory innovation in the line of Brion *et al.* (2010). The ambidextrous MCS was also measured by multiplying iMCS by dMCS. Finally, the ambidextrous leadership forms a construct of transactional and transformational leadership styles in the line of the research of Doeleman *et al.* (2012).

TABLE 1
Sample demographics

Characteristics	Frequency	Percentage
Respondent's gender		
Men	167	71.98%
Women	65	28.02%
Respondent's age		
> 39 (Generation Y)	62	26.72%
39-54 (Generation X)	106	45.69%
> 54 (Baby-boomers)	64	27.59%
Respondent's education		
University	232	100%
Respondent's experience		
5-10 years	33	14.22%
10-15 years	95	40.95%
15-20 years	104	44.83%
Respondent's position		
Chief executive officer	38	16.38%
Senior manager controller	53	22.84%
Chief operating officer	32	13.79%
Chief financial officer	28	12.07%
Senior R&D manager	81	34.91%
Firm's size		
10-49 employees	21	25.92%
50-250 employees	37	45.68%
>250 employees	23	28.40%
Firm's age		
3-5 years	10	12.35%
6-10 years	25	30.86%
>10 years	46	56.79%
Firm's sector of activities		
Business consultancy	10	12.35%
Financial services	29	35.81%
ICT	34	41.97%
Accounting services	5	6.17%
Advertising services	3	3.7%



To take into account the differences between firms, we include in the model control variables, namely firm size and firm age which are linked according to many scholars to innovation (Coad *et al.*, 2016; Vaona and Pianta, 2008). Indeed, Coad *et al.* (2016) revealed that young firms implement riskier and radical innovation activities. Acs and Preston (1997) outlined also that young firms innovate more than mature companies. Firm age mirrors the company's past success and may affect innovation. Moreover, large companies can more easily attract the resources needed to innovate and are likely to perform riskier and radical activities more than small companies (Vaona and Pianta, 2008). The firm size was conceptualized by the number of the employees in the firm. We measured firm age by the number of years since company's foundation.

As recommended by Reis and Judd (2000), we performed an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) to assess the psychometric properties of the scales. A principal component analysis was realized using the Varimax rotation method through the SPSS 21.0 software. We eliminated items with low communalities. For all items retained, the factor loadings were above 0.60 (Bagozzi and Yi 1988). Moreover, for all scales, the percentage of variance explained was greater than 60% (Hair *et al.*, 2014). In addition, we checked the Cronbach alpha to verify the reliability of scales. As can be seen in Table 2, the Cronbach alpha values range from 0.703 to 0.967 and thus are greater than the cut-off of 0.7 recommended by Nunnally and Bernstein (1994). The EFA generates a one-dimensional measurement scale for exploitative innovation, exploratory innovation, dMCS and iMCS, respectively. For leadership styles, a four-dimensional scale for the transformational leadership and three dimensions for transactional leadership were generated by the data analysis. Table 2 depicts the percentage of variance explained and the Cronbach alpha of all constructs.

A CFA was carried out through the Smart PLS 3 software. For transformational and transactional leadership styles, we used a second-order models. In this perspective, a second order model can be adopted by verifying that there are strong correlations among the first order factors. Findings reveal that the links between the first-order factors and the second order construct are superior to 0.5 (Roussel *et al.*, 2002). As recommended by Hair *et al.* (2014), we verified the reliability and validity of constructs. The convergent validity of constructs was

TABLE 2
Dimensionality, reliability and convergent validity of constructs

Constructs	Number of Items	Cronbach Alpha	AVE
Exploitative innovation	5	0.880	0.676
Exploratory innovation	4	0.900	0.769
dMCS	4	0.779	0.582
iMCS	4	0.885	0.742
Idealized influence	3	0.895	0.823
Individualized consideration	3	0.709	0.633
Inspirational motivation	3	0.824	0.739
Intellectual stimulation	4	0.743	0.658
Contingent rewards	3	0.836	0.760
Management by exception active	3	0.703	0.624
Management by exception passive	3	0.967	0.938

examined via the average variance extracted (AVE) index, which ranges from 0.582 to 0.938 (Table 2) and hence meets the threshold of 0.5 proposed by Fornell and Larcker (1981). Discriminant validity was assessed by ensuring that the square root of the AVE of each construct is greater than the correlations between factors (Table 3) (Fornell and Larcker, 1981). We also checked cross-loadings, which revealed that each item loads highest on its specific scale. Discriminant validity is thus assessed. In addition, we evaluated the common method bias (CMB) in the line of Podsakoff *et al.* (2012). In this line, we calculated the Harman's single factor score by loading all items into one common factor. Findings outlined that the total variance for the common factor is 0.41 and is thus under the cut-off of 0.5 recommended by Podsakoff *et al.* (2012). Thus, the CMB does not impact our data.

TABLE 3
Discriminant validity of constructs

	M	SD	DC	IC	IEL	IER	II	CID	MI	SI	MA	MP	CR	FA	FS
DC	3.442	0.912	0.763												
IC	3.644	0.864	0.308	0.861											
IEL	3.562	0.885	0.628	0.351	0.822										
IER	3.356	1.024	0.354	0.665	0.578	0.877									
II	2.454	0.483	-0.095	0.237	0.116	0.256	0.907								
CID	2.945	0.734	0.193	0.442	0.329	0.337	0.238	0.796							
MI	3.754	0.623	0.057	0.310	0.103	0.317	-0.020	0.208	0.859						
SI	3.744	0.854	0.205	0.304	0.182	0.458	-0.097	0.269	0.307	0.811					
MA	3.567	0.632	0.085	0.299	0.204	0.213	-0.033	0.411	0.418	0.360	0.790				
MP	2.745	0.743	-0.023	0.185	0.064	0.253	0.299	0.287	0.417	0.185	0.279	0.969			
CR	3.835	0.825	0.520	0.279	0.670	0.345	0.006	0.289	0.198	0.364	0.278	0.219	0.872		
FA	53.85	45.908	0.033	0.002	-0.037	0.039	-0.015	-0.002	0.104	0.178	-0.018	-0.002	0.025	1	
FS	266.4	183.4	0.052	-0.088	0.006	-0.108	0.008	-0.050	-0.114	-0.283	-0.180	-0.278	-0.026	-0.012	1

DC: diagnostic MCS, IC: interactive MCS, IEL: exploitative innovation, IER: Exploratory innovation, II: Idealized influence (attributed), CID: Individualized consideration, MA: management by exception active, MP: Management by exception passive, MI: Inspirational motivation, CR: Contingent rewards, SI: Intellectual stimulation, FA: Firm age, FS: Firm size.



Results

In order to test our conceptual model, we performed a Partial Least Square-Structural Equation Modeling method through the Smart PLS software 3. This approach is suitable for this study since its ability to test relationships between numerous variables with multiple measurement items and the small size of our sample (Hair *et al.*, 2014). Findings revealed that the value of Standardized Root Mean Squared Residual (SRMR) is 0.054 and thus is below 0.08 as recommended by Hu and Bentler (1999). We checked also the R2 index to assess the quality of the structural model. This index is equal to 0.502 for exploratory innovation and to 0.485 for exploitative innovation and thus is above the cut-off of 0.1 recommended by Hair *et al.* (2014). Table 4 depicts the results of the PLS analysis related to

the test of the direct links between variables. For the model 1 tested, data analysis revealed that iMCS has a positive and significant influence on exploratory innovation ($\beta=0.451$, $p<0.001$) and not a significant effect on exploitative innovation ($p>0.05$). H1 is thus confirmed and H2 is rejected. dMCS is not significantly linked to exploratory innovation ($p>0.05$) but is associated significantly with exploitative innovation ($\beta=0.523$, $p<0.001$). Consequently, H3 is rejected and H4 is confirmed. For the second model tested, our results confirm hypothesis H5 and indicate that the combination of iMCS and dMCS has a positive impact on ambidextrous innovation ($\beta=0.510$, $p<0.001$). For the two models tested, firm size and firm age do not affect positively all types of innovation ($p>0.05$). For this second model, the R2 index is equal to 0.560 for ambidextrous innovation.

TABLE 4
Results of direct links

Links	Exploitative innovation			Exploratory innovation			Ambidextrous innovation		
	β	C.R.	p	β	C.R.	p	β	C.R.	p
Model 1									
iMCS	0.095	1.336	0.182 (ns)	0.451	5.015	0.000 (***)			
dMCS	0.523	4.663	0.000 (***)	0.163	1.894	0.059 (ns)			
Transactional leadership	0.303	2.305	0.012 (*)	-	-	-			
Transformational leadership	-	-	-	0.288	2.274	0.021 (*)			
Firm age	0.072	0.956	0.339 (ns)	-0.017	0.259	0.796 (ns)			
Firm size	-0.060	1.066	0.192 (ns)	-0.036	0.434	0.665 (ns)			
Model 2									
iMCSxdMCS (Ambidextrous MCS)							0.510	6.583	0.000 (***)
Ambidextrous leadership							0.357	2.581	0.005(**)
Firm age							-0.042	0.550	0.583 (ns)
Firm size							0.043	0.711	0.477 (ns)

β : Standardized regression coefficient, C.R.: Critical ratio, p: significance level

***= $p < 0.001$, **= $p < 0.01$, *= $p < 0.05$, ns=non significant



The moderating effects of transformational and transactional leadership styles were tested via the PLS path modeling. The two-stage approach was used (Hair *et al.*, 2014) and consists of calculating the product indicator that materializes the effect of the interaction between the moderator and the independent variables on dependent variable. Table 5 depicts the findings generated by SMART PLS for moderating effects (Hair *et al.*, 2014). This analysis shows that transformational leadership style is positively and significantly associated with exploratory innovation ($\beta=0.303$, $p>0.05$) and that transactional leadership style has a significant and positive effect on exploitative innovation ($\beta=0.288$, $p>0.05$). In this perspective, results revealed that transformational leadership moderates the relationship between iMCS and exploratory innovation ($\beta=0.195$, $p<0.05$). In addition, transactional leadership moderates the link between diagnostic MCS and exploitative innovation ($\beta=0.213$, $p<0.05$). Results also revealed that ambidextrous leadership is positively and significantly associated with ambidextrous innovation ($\beta=0.357$, $p<0.01$). Finally, ambidextrous leadership moderates the relationships between the ambidextrous MCS and ambidextrous innovation ($\beta=0.246$, $p<0.05$).

TABLE 5 Results of moderating effects				
Link	Moderator variable	β	C.R.	p
iMCS-Exploratory innovation	Transformational leadership	0.195	1.984	0.046 (*)
dMCS-Exploitative innovation	Transactional leadership	0.213	2.176	0.037 (*)
Ambidextrous MCS-Ambidextrous innovation	Ambidextrous leadership	0.246	2.589	0.015 (*)

*= $p < 0.05$

FIGURE 3
Results of model 1 tested

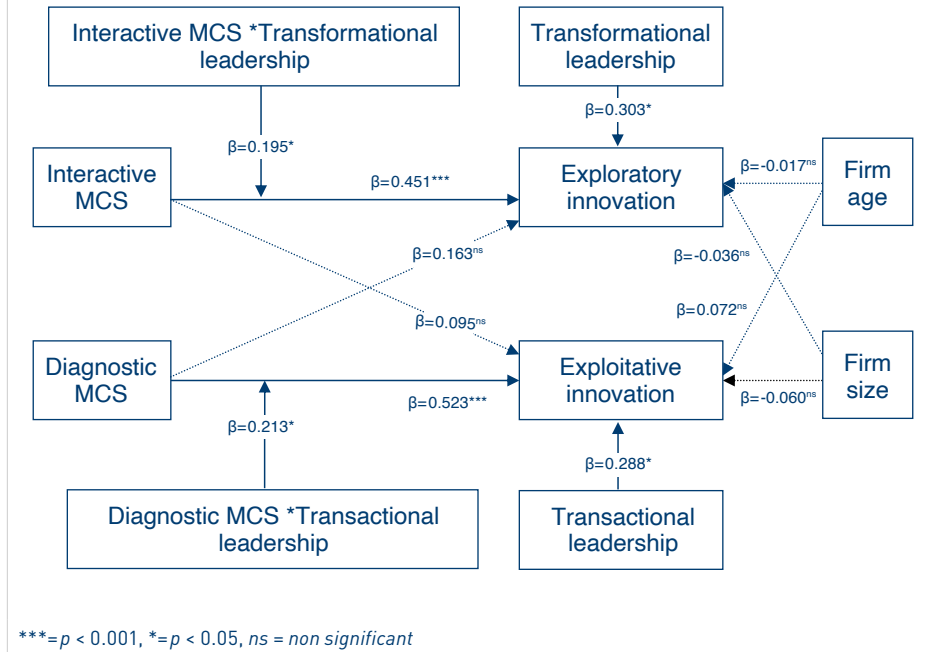
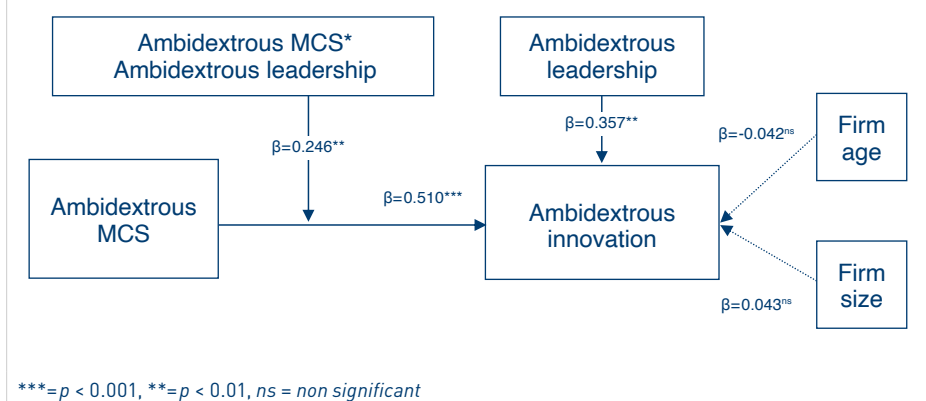
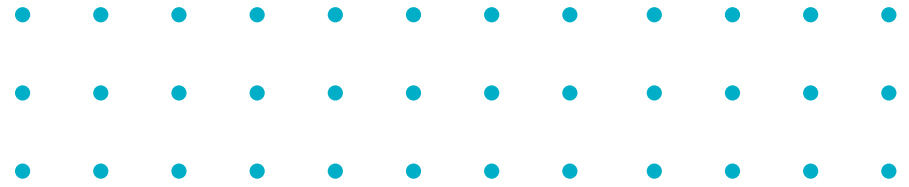


FIGURE 4
Results of model 2 tested





Discussion

Our empirical research provided some relevant results concerning the links between MCS, innovation, and different styles of leadership (Figure 3 and Figure 4). Our findings are consistent with other authors who found that iMCS is beneficial for exploratory innovation (Bedford, 2015; Davila, 2005). This supports the argument that the interactive type of control encourages employees to act creatively and to take initiative to explore new opportunities (Henri, 2006), which increases the propensity of the firm to develop new products, services and processes. This type of MCS is a catalyst of the establishment of a collective intelligence inside the organization, the development of new organizational capabilities and the challenge of current strategies (Mundy, 2010). It stimulates the exploration of new strategies (Simons, 1995) and makes firms more likely to create new products and processes. In addition, our findings are consistent with researchers that suggested that iMCS affects only exploratory innovation rather than exploitative innovation (Bedford, 2015; Widener, 2007). Our results, however, do not find support to Gschwantner and Hiebl (2016)'s research that revealed that iMCS fosters both exploration and exploitation. The iMCS plays a fundamental role in stimulating dialogues and questioning of the beaten tracks and is a lever of the articulation of emerging strategies in the innovation process (Cruz *et al.*, 2015; Frezatti *et al.*, 2017; Simons, 1991). The interactivity increases the quality of communication and collaboration inside the firms, generates the creation of new knowledge, optimizes the organizational learning and allows exploratory projects to work better.

Moreover, our findings corroborate the research of Bedford (2015) and Mundy (2010) who found that dMCS fosters exploitative innovation. However, our results are consistent with prior studies that pointed out that dMCS is not associated with exploration activities (Bedford, 2015; Henri, 2006). Indeed, dMCS is not likely to reinforce the firms' ability to radically innovate as it is associated with mechanistic control structures and thus maintains the status-quo (Henri, 2006). This control system focuses on achieving goals through exploitation of existing knowledge rather than breaking down with routines and do not provide the possibility for employees to search for new ways of doing things. Thus, an iMCS may lead to an imbalance in ambidextrous innovation as a result of focusing on exploratory innovation to the detriment of exploitative innovation. Also, dMCS

may engender an imbalance in ambidextrous innovation in favor of exploitative innovation. In this line, it rather seems, according to the results, that the balance between iMCS and dMCS conducts to the simultaneously pursuit of exploratory and exploitative innovations, namely ambidextrous innovation. In this line, the control is viewed as a guarantee of stability by exploiting routines and best practices and is also a lever of change by promoting exploratory innovations. Conciliating iMCS and dMCS is a vector of firms' innovation (Dangereux, 2017). The two types of MCS are likely to complement each other and such an association can bring out synergies (Dangereux, 2017) and positively affects the firms' ability to jointly pursue exploitative and exploratory innovations (Renaud, 2013). While exploratory innovation requires exploration of new opportunities and emergence of new ideas permitted by iMCS, exploitative innovation passes through an exploitation of routines and current capabilities through dMCS. In this line, firms are likely to reconcile between the ability to achieve exploratory innovation, manage uncertainties and risky processes and challenge existing best practices and the ability to promote exploitative innovation. Robertson and Swan (2003) stated that for the case of KIFs, the knowledge workers who possess particular skills and are partners rather than subordinates and the kind of work in such firms requires a great amount of autonomy. According to these authors, this situation may create dilemma regarding how to balance uncertainty-control and autonomy and efficiency with flexibility. The response to this dilemma is to conciliate between iMCS and dMCS in order to push employees to strive to develop innovative solutions and to refine existing practices.

To achieve ambidextrous innovation, firms have to combine between iMCS and dMCS. These MCSs are the two sides of an ambidextrous MCS (Lehmann-Ortega and Naro, 2008; Renaud, 2013). MCS is used diagnostically to guarantee the execution of deliberate strategies and the controlling of key success factors that allow achieving predetermined objectives and exploiting existing knowledge (Hoffman *et al.*, 2012; Lartigau and Nobre, 2011). In this line, management controllers use formal tools such as budgets and reporting. MCS is used also interactively to raises the dynamic capabilities of the firm, foster the development of new strategies, review the relevance of existing goals, procedures and strategies and explore new ways of doing things. Organizational members resolve problems collectively and interact through meetings, brainstorming sessions, performance reviews and bottom-up decision making (Lehmann-Ortega and Naro, 2008).



Ambidextrous MCS have to be implemented to avoid, on the one hand the excessive focus on dMCS that may conduct to the status-quo, the obsolescence of knowledge, the usage of rules and principles company that are no longer adapted to strategic and environmental changes. On the other hand, the excessive use of iMCS may inhibit the detection and restraint of problems performed by dMCS, lead to overinvestment in exploration and does not allow the company to use its existing knowledge and competences and to respond enough to the needs of the existing market. Renaud (2013) showed that a single MCS can be used both diagnostically to monitor the achievement of the objectives and interactively to search for new knowledge to improve the company's strategy.

Our data analysis shows also that transformational leadership moderates the relationship between iMCS and exploratory innovation. The data analysis highlighted that transactional leadership is associated to exploratory innovation. The transformational leadership is likely to motivate employees, encourage their creative thinking and autonomy and intellectually stimulate them to explore new ways of doing things. The iMCS boosts the organizational learning and the creative discussion and interaction which can be reinforced thanks to transformational leadership. This style of leadership may articulate the strategic renewal promoted by the interactive system, influence how the MCS is used and how employees react to this system (Cruz *et al.*, 2015). This finding is in the same vein of the studies of Afsar *et al.* (2017) and Berraies and Zine El Abidine (2019) performed on samples of KIFs which revealed that in the case of such firms, the transformational leadership is more effective than transactional leadership regarding fostering knowledge workers' entrepreneurial behaviors and creativity and firms' exploratory innovation. Indeed, in the knowledge-intensive firms, leaders face the challenge of searching how to intrinsically motivate the employees who seek for autonomy and need for achievement.

We found also that transactional leadership moderates the link between the dMCS and the exploitative innovation. Transactional leadership is appropriate to a dMCS as it is effective in promoting the use of existing knowledge and best practices, encouraging employees to comply with rules and procedures on the basis of a reward/punishment process and supporting exploitative projects. Berraies and Bchini (2019) who surveyed a sample of Tunisian KIFs stressed that one dimension of transactional leadership style is particularly important namely the contingent rewards. They suggested in this sense that the contingent

rewards that gratify subordinates who accomplished tasks well tend to foster exploitative innovation. However, the punishing of bad performance inhibits experimentation, risk taking and exploratory innovation. In the perspective of Berraies and Bchini (2019), the monetary rewards represent determinants of knowledge workers' motivation as they tend to perceive those rewards as a sign that their leaders value them and recognize their efforts.

Finally, our findings revealed that ambidextrous leadership reinforces the links between ambidextrous MCS and ambidextrous innovation. Combining the transformational leadership style which is likely to promote exploratory innovation and is suitable to iMCS and the transactional leadership style that is a vector of exploitative innovation and concords with dMCS may help firms to achieve ambidextrous innovation. This result is in the same vein of Berraies and Bchini (2019) who outlined that KIFs need a mixture of transactional and transformational leadership styles. Ambidextrous leadership accommodates the tensions between pursuing diverse goals and perspectives by flexibly alternate between transactional and transformational leadership styles (Luo *et al.*, 2018). Leaders should use transactional behaviors to foster exploitative behaviors and in the case of dMCS is used. Moreover, when the iMCS is used, transformational leadership is more appropriate to foster organizational learning and boost exploration. Thus, the simultaneously use of iMCS and dMCS requires also employing simultaneously both transformational and transactional leadership styles to achieve ambidextrous innovation.

In this regard, we can stipulate that the concept of ambidextrous leadership is closer to the concept of creative leadership, defined as the leadership that both challenges current manners of doing things and that combines existing ones (Sternberg *et al.*, 2004). Makri and Scandura (2010) suggest that for KIFs, balancing between creative and operational leadership may build effective leadership style. Through creative leadership, leaders support talents by encouraging initiatives and searching for opportunities and new knowledge externally, while operational leaders boost existing knowledge application and internal knowledge development. To simultaneously create and explore new knowledge and apply and explore existing knowledge to lead effectively in KIFs, leaders have to balance between operational and creative leadership styles to generate synergistic effects resulting in exploitative and exploratory innovations (Makri and Scandura, 2010).



Conclusion

Theoretical Contributions

This research contributes to fill the gap in the literature in numerous ways. First, while several studies have already examined the influence of MCS on innovation, few ones have examined the relationship between two levels of control of MCS, namely iMCS and dMCS, and exploitative and exploratory innovations. Furthermore, none has questioned the moderating effect of the styles of leadership in this link. In this line, our results outlined the importance of the iMCS as a vector of exploratory innovation and the moderating effect of transformational leadership in this relationship. In addition, findings revealed that dMCS is a determinant of exploitative innovation and highlighted the moderating effect of transactional leadership in this link. Second, our study emphasized the importance for firms to combine two types of MCS in a complementary way in order to achieve ambidexterity. This research is in the perspective of recent studies that suggested that the firms' performance and survival are based on its capacity to manage paradoxes or conflicting objectives such as exploitative innovation and exploratory innovation (Benner and Tushman, 2003), innovation and control (Dangereux, 2017) or iMCS and dMCS (Renaud, 2013). In this line, our results suggest that the synergy resulting from the combination of two logic of MCS -diagnostic and interactive- is likely to allow the firms to build competencies ensuring ambidextrous innovation. Third, this research goes beyond the traditional idea of contradiction between transformational and transactional leadership styles and suggest in the perspective of Luo *et al.* (2018) that these styles are complementary. Few studies have investigated the impact of the combination of these leadership styles to achieve simultaneously exploratory and exploitative innovations. Our study pioneers the analysis of the moderating effect of the ambidextrous leadership that combine between these two styles of leadership in the link between the ambidextrous MCS and ambidextrous innovation.

Managerial Implications

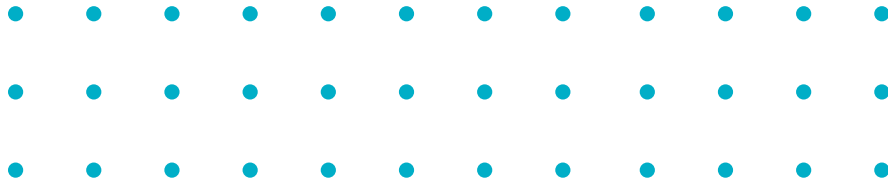
This research is interesting for managers who are seeking to develop their MCS. Results show the importance for managers to implement a MCS that integrate both interactive and diagnostic levels of control in order to profit from its complementarily and synergy. Managers need to reconsider the manner in

which controls are used. More emphasis on the iMCS is more likely to generate exploratory innovation at the detriment of exploitative innovation and thus could produce uncertain and negative returns on the short term (Ben Rejeb *et al.*, 2019). Also, focusing on dMCS is more likely to foster exploitative innovation at the expense of exploratory innovation and thus may engender a slow renewal of knowledge and a loss of a firms' strategic capacity. Implementing a combination of iMCS and dMCS is particularly important in the context of KIFs where knowledge workers seek for autonomy and fewer formal controls to improve their creativity. This combination of such control systems, as it is difficult to imitate, may represent a distinctive organizational capability and a key source of sustainable competitive advantage (Pešalj *et al.*, 2018). The complementary of the iMCS and dMCS helps the firms to balance between short-term and long term's objectives, generates single and double loops of learning (Pešalj *et al.*, 2018), which fosters ambidextrous innovation.

Our study may also provide lighting to managers on the necessity to adopt an appropriate mix between transformational and transactional leadership styles in order to reinforce the effect of the MCS on ambidextrous innovation. As suggested by Luo *et al.* (2016), managers should use opposing and contradictory values to foster exploitation and exploration by leading ambidextrously. As such, firms must ensure rigorous leadership training to allow leaders to develop such ambidextrous capabilities and behaviors and how to mix and switch between transformational and transactional styles. With transformational behaviors, leaders of KIFs may facilitate interactive control, cultivate creativity among employees and encourage them to make extra efforts, to explore new ways of doing things and to create new things which generate more job meanings for them. With transactional behaviors, leaders can facilitate diagnostic control, give corrective feedback to improve tasks and align the behaviors of the employees with the organizational strategy.

Limits and Research Perspectives

This study has a number of limitations. The sample size is small. The two research models have thus to be tested in a larger sample to enhance generalization of the results. In addition, the data collection is based on a convenience sampling method that undermines the results' generalization. In this line, researchers could use a probabilistic sampling method to generate more generalizable

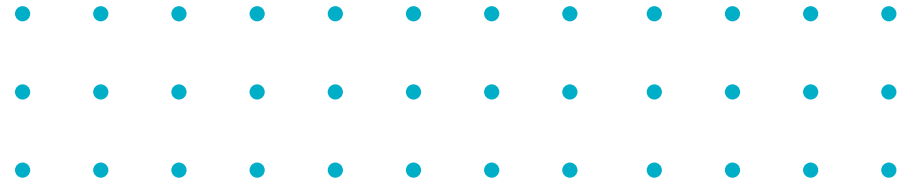


findings. Moreover, other mediating or moderating variables could be added to the research models. Future research could examine the mediating effect of organizational learning between MCS and innovation. In addition, researchers could analyze the moderating role of each dimension of transactional and transformational leadership styles to highlight which ones are the most effective in reinforcing the relationship between MCS and exploratory and exploitative innovations. The environment stability could be also added as moderating variable. Our research focused only on two levels of control (interactive and diagnostic) developed by Simons (1995) and excluded the informal MCS. Instead of focusing only on dMCS and iMCS, other quantitative studies could highlight the contribution of the four levels of MCSs on ambidextrous innovation.

It is also interesting to conduct a qualitative research to understand in depth the manner in which the MCS is performed in practice and in particular in order to study in depth the way in which the firms implement iMCS and dMCSs. This qualitative study may explain how the iMCS and the dMCS concretely interact. Indeed, the quantitative research performed does not allow us to understand the balance between the iMCS and dMCS. In addition, considering the cross-sectional design employed in this research, only the companies' strategic position regarding the MCS and innovation ambidexterity is taken into account and presumes that this position is unchanging (Bedford, 2015). However, some companies surveyed may be in the state of strategic changes. In this sense, a longitudinal research can better emphasize the dynamic relationships between these variables. A case-bases studies could allow also to enrich this study and to better apprehend the problematic of our research. In the same way, it would be interesting to wonder about the tensions, paradoxes, to which an ambidextrous control could answer. As recommended by Lehmann-Ortega and Naro (2008), it is interesting to explore how iMCS and dMCS interact by understanding in particular the role of learning transfer between these two systems and how firms could develop ambidextrous MCS to deal with the paradox of exploration vs exploitation and build dynamic abilities. Also, the qualitative study may permit to explain the contribution of the complementarity of the four levers of control highlighted by Simons (1995), as a dynamic capability of firms in building an effective MCS generating ambidextrous innovation. It would be also interesting to perform a cross-cultural study. A comparative study between for example KIFs and industrial firms could be conducted.

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APPENDIX

Scales of measurement of variables

Exploratory innovation

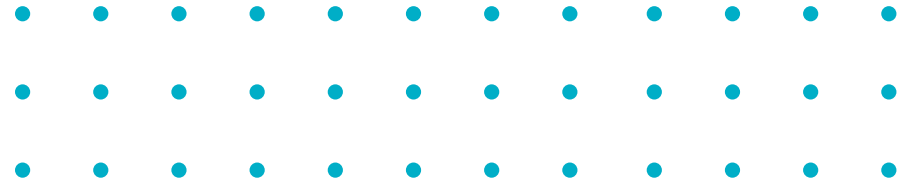
1. Our unit accepts demands that go beyond existing products and services.
2. We regularly search for and approach new clients in new markets.
3. We commercialize products and services that are completely new to our unit.
4. We experiment with new products and services in our local market.
5. We invent new products and services.
6. Our unit regularly uses new distribution channels.
7. We frequently utilize new opportunities in new markets.

Exploitative innovation

1. We frequently refine the provision of existing products and services;
2. We introduce improved, but existing products and services for our local market;
3. We regularly implement small adaptations to existing products and services;
4. We increase economies of scales in existing markets;
5. Lowering costs of internal processes is an important objective;
6. We improve our provisions efficiency of products and services;
7. Our unit expands services for existing clients.

Leadership styles

1. I provide others with assistance in exchange for my efforts.
2. I re-examine critical assumptions in order to question whether they are appropriate.
3. I fail to interfere until problems become serious.
4. I focus attention on irregularities, mistakes, exceptions, and deviations from standards.
5. I talk about my most important values and beliefs.
6. I seek differing perspectives when solving problems.
7. I talk optimistically about the future.
8. I instill pride in others for being associated with him/her.
9. I discuss in specific terms who is responsible for achieving performance targets.
10. I wait for things to go wrong before taking action.
11. I talk enthusiastically about what needs to be accomplished.
12. I specify the importance of having a strong sense of purpose.
13. I spend time teaching and coaching.
14. I make clear what one can expect to receive when performance goals are achieved.
15. I show a firm belief in "If it ain't broke, don't fix it".
16. I go beyond self-interest for the good of the group.
17. I treat others as individuals rather than just as a member of a group.



APPENDIX

Scales of measurement of variables

18. I act in ways that builds my respect.
19. I concentrate full attention on dealing with mistakes, complaints, and failures.
20. I consider the moral and ethical consequences of decisions.
21. I keep track of all mistakes.
22. I articulate a compelling vision of the future.
23. I direct attention toward failures to meet standards.
24. I consider each individual as having different needs, abilities and aspirations from others.
25. I get other to look at problems from many different angles.
26. I help others to develop their strengths.
27. I suggest new ways of looking at how to complete assignments.
28. I emphasize the importance of having a collective sense of mission.
29. I express satisfaction when others meet expectations.
30. I express confidence that goals will be achieved.
31. I demonstrate that problems must become chronic before taking action.
32. I display a sense of power and confidence.
Interactive management control system
1. Controls are often used as a means of developing ongoing action plans.
2. Controls are used regularly in scheduled face-to-face meetings between operational and senior managers.
3. There is a lot of on-going interaction between operational management and senior managers.
4. Controls generate information that forms an important and recurring agenda in discussions between operational and senior managers.
5. Controls are used by operational and senior managers to discuss changes that are occurring within the business unit.
Diagnostic management control system
1. Controls are used to track progress towards goals and monitor results.
2. Controls are used to plan how operations are to be conducted in accordance with the strategic plan.
3. Controls are used to review performance
4. Controls are used to identify significant exceptions from expectations and take appropriate actions.