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Drivers of adaptive resilience of public sector organizations: an investigation into the individual characteristics of hybrid professional managers

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ABSTRACT

The COVID-19 pandemic emphasized the importance of resilience of public sector organizations. Drawing from Upper Echelons Theory, this study investigates the relationship between configurations of demographic and background characteristics of hybrid professional managers and organizational adaptive resilience. Specifically, it focuses on heads of 34 Italian public clinical laboratories in the Veneto Region during the first wave of the pandemic. Based on fuzzy set Qualitative Comparative Analysis, the findings show four different combinations of attributes that lead to high levels of adaptive resilience. A key role is played by being a female manager and possessing a high level of organizational tenure.

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KEYWORDS Hybrid professional managers; upper echelons theory; organizational adaptive resilience; fsQCA; healthcare

Introduction

The involvement of professionals, such as doctors, nurses, and teachers, in leadership and management positions of public sector organizations has long been a focal point of New Public Management (NPM) reforms (Noordegraaf et al. 2016). This trend has characterized many public services across the world, leading to an increasing presence of 'hybrid' professional managers in governing roles. Professional-turned-managers are expected to balance their professional duties with managerial tasks such as staff development, planning, and budgeting, as well as being involved in strategic decisions when taking on leadership roles (Kirkpatrick, Altanlar, and Veronesi 2022). In healthcare, a growing consensus has developed around the need to increase the number of medical practitioners and other healthcare professionals, like nurses, physiotherapists and so forth, in leadership and management roles, with clinical leadership moving from 'the dark side to centre stage' (Ham, Clark, and Spurgeon 2011, 11). In turn, it is

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believed that this shift can significantly contribute to the performance enhancement of healthcare organizations (Kirkpatrick, Altanlar, and Veronesi 2023). At the strategic level, for example, clinical leaders are considered crucial for facilitating the successful implementation of transformative initiatives (Jones and Fulop 2021).

The rationale supporting a more pronounced clinical involvement in organizational decision-making is based on the premise that hybrid professional managers possess greater knowledge, understanding, and legitimacy than managers without a clinical background (Dorgan et al. 2010). In addition to potentially leading to a more efficient resource allocation due to their 'informational advantages' (Molinari et al. 1995), the greater credibility of clinical leaders can facilitate the acceptance and implementation of change projects (Veronesi, Kirkpatrick, and Vallascas 2014). In alignment with these theoretical suggestions, most of the extant empirical literature shows a positive effect of hybrid professional managers, particularly at the strategic level, on organizational performance (Clay-Williams et al. 2017; Kirkpatrick, Altanlar, and Veronesi 2023). However, less attention has been paid to examining the contribution of hybrid professional managers in contexts characterized by heightened complexity and uncertainty.

Healthcare organizations are broadly acknowledged to operate within a complex but stable environment (Mintzberg 1992). Complexity arises from engaging in the delivery of services that necessitates extensive training, expertise, and coordination, while stability originates from the well-defined and mostly standardized nature of the majority of the processes of healthcare provision. However, disruptive events such as the COVID-19 pandemic can force healthcare organizations to absorb, respond to and recover from an unprecedented array of internal and external pressures (Donelli et al. 2022). This leads to a departure from the paradigm of stability in healthcare provision while simultaneously adding further elements of complexity. Thus, both during and in the aftermath of the global pandemic, healthcare organizations have been compelled to navigate uncharted territory and dynamically adjust their processes and operational capabilities to effectively cope with a rapidly changing context.

While all healthcare professionals have been involved in this process of rapid response and adaptation to a more complex and unstable environment, hybrid professional managers have been especially required to make sound strategic decisions, devise novel protocols, re-prioritize resource allocation and orchestrate timely interventions (Leonelli et al. 2023). The effective management of the COVID-19 pandemic has, therefore, brought to the fore the key role played by hybrid professional managers in fostering the resilience of healthcare organizations.

The concept of resilience was first introduced in the field of public management in the 1980s, when Wildavsky (1988) highlighted its significance as a primary strategy for managing risk and uncertainty in modern society. As the study of disaster and crisis management within public administration scholarship has evolved, resilience has progressively become a central concept for analysing complex public governance systems (Boin and Lodge 2016). Organizational resilience, in particular, has garnered significant attention, with most definitions focusing on an organization's ability to absorb pressures and preserve or improve its functioning in the presence of adversity (Kahn et al. 2018).

Within the notion of organizational resilience, a crucial, conceptual differentiation exists between organizational planned resilience, which refers to an organization's ability to effectively respond to future crises through prior preparation and planning,

and organizational adaptive resilience, which relates to an organization's ability to effectively navigate and overcome adversity in the emergence of a crisis (Barasa, Mbau, and Gilson 2018). In this paper, we focus on the latter, namely organizational adaptive resilience in response to the COVID-19 pandemic. This choice is motivated by the recognition that the pandemic has presented an extraordinary and unprecedented challenge to healthcare organizations worldwide. As suggested by Turner (2022), relying solely on planned resilience would have been inadequate to effectively respond to the crisis. Precisely, we wanted to investigate what led to successful organizational adaptive resilience from the managerial perspective, and more specifically in relation to the role played by configurations of individual characteristics of hybrid professional managers.

Drawing from Upper Echelons Theory (UET) (Hambrick 2007; Hambrick and Mason 1984), we understand organizational adaptive resilience as a reflection of the values and cognitive foundation of those managers tasked with the responsibility to develop new capacities that enhance an organization's sustainability and effectiveness (Barasa, Mbau, and Gilson 2018). Since such psychological constructs are empirically difficult to observe, Hambrick and Mason (1984) suggest that the demographic and background characteristics of managers can serve as proxies for their cognitive base and values. Thus, our study investigates what combinations of demographic and background attributes of hybrid professional managers have increased organizational adaptive resilience in response to the COVID-19 pandemic. As far as we are aware, there are no studies analysing combinations of managerial characteristics and their impact on performance outcomes in the public sector, let alone in relation to resilience, and very few in non-public settings (e.g. Díaz-Fernández, González-Rodríguez, and Simonetti 2020).

The study focuses on clinical laboratories in publicly owned hospitals based in a northern Italian region, Veneto. This case is theoretically interesting as in Italy health policy decisions are devolved to regions (Sarto et al. 2016), and Veneto was among the first areas of Europe to experience the impact of the pandemic in 2020. During the early stages, one of the region's key health policy decisions was to maximize the number of diagnostic tests to gauge levels of infection in hospitals and the community (Romagnani et al. 2020). Precisely, in addition to the social distancing dictated by the national government, Veneto developed a comprehensive public health strategy to prevent the spread of COVID-19 which relied significantly on the involvement of public clinical laboratories. The main aim of this strategy was to stop all possible virus transmission chains by focusing on case finding, contact tracing and quarantining all possible case contacts (both close and occasional) (Russo et al. 2020). All heads of clinical laboratories had a great deal of autonomous decision-making power and independence in terms of resource allocation and, therefore, their role conformed with the notion of executive management position at the core of UET.

In what follows, we first review the literature on organizational resilience, specifically focusing on its adaptive dimension. Subsequently, we develop the theoretical framework of the study by integrating the assumptions of UET with the scholarship on hybrid professional managers. Then, the data collection process and the adopted methodology, based on a combination of a DEA-Malmquist Productivity Index (MPI) and fuzzy-set Qualitative Comparative Analysis (fsQCA), will be described. Finally, the empirical results will be presented and discussed, making sense of the specific combinations of individual demographic and background characteristics of

hybrid professional managers that enable their organizations to achieve high levels of adaptive resilience, with implications for theory, research, policy, and practice.

Organizational adaptive resilience

Scholarship around organizational resilience in the public sector has gained increasing traction in recent years (e.g. Boin 2010; Boin and Lodge 2016), and its relevance has significantly grown during and in the aftermath of the COVID-19 pandemic, particularly (but not exclusively) in the healthcare sector. As we have seen, at the organizational level, resilience refers to an organization's ability to effectively handle and respond to various forms of adversity, shocks, or unexpected events (Duchek, Raetze, and Scheuch 2020). For example, Lee, Vargo, and Seville (2013) define organizational resilience as the capacity to survive and potentially thrive during times of crisis, while Lengnick-Hall, Beck, and Lengnick-Hall (2011) associate resilience with an organization's 'ability to absorb, develop context-specific responses to, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organizational survival' (p. 244). Furthermore, it is suggested that a resilient organization maintains a high level of performance even when faced with mounting environmental pressures, threats, and uncertainties (Boin and Van Eeten 2013).

As mentioned, a key differentiation in the understanding of organizational resilience is between planned and adaptive resilience (Boin and Van Eeten 2013; Lee, Vargo, and Seville 2013), with the former focusing on a proactive approach to crisis management, while the latter concentrates on successfully responding to unplanned crisis events (Turner 2022). Studies on planned resilience emphasize the importance of slack resources and resource availability, including financial means (Barasa, Mbau, and Gilson 2018), as well as tools and techniques for improving emergency preparedness (Crichton, Ramsay, and Kelly 2009). Conversely, the literature on adaptive resilience highlights the development of new capabilities in response to a crisis, which may lead to the acquisition of new skills or knowledge (Turner 2022). Thus, environmental challenges or disturbances can be seen as triggers for adaptive resilience (McCarthy, Collard, and Johnson 2017).

The process of adaptive change is theorized as being driven by variation, which can originate from either informal practices, such as improvisation, or formal programmes (Boin and Van Eeten 2013). Given the unprecedented circumstances generated by the COVID-19 pandemic, suggested 'recipes' for enhancing the responses of healthcare organizations, in alignment with the development of adaptive resilience, place emphasis on several key factors, including flexibility, trust, collaboration, and experimentation (Turner 2022). In this regard, the utilization and flexible integration of ideas, tools, and resources existing within the organization are crucial components in identifying a feasible solution to effectively address the challenges stemming from the disruptive event (Ansell, Sørensen, and Torfing 2021). Additionally, it is recommended to adopt 'open' decision-making processes and ensure timely communication (Chua et al. 2020).

The process of adaptation to emerging problems can be enhanced when managers engage in dialogue with employees and stakeholders, seeking their insights to expedite the learning process (Turner 2022). Furthermore, in times of crisis, managers are required to rely on their intuition to make sense of real-time data, draw lessons from

past experiences, and adapt to unusual circumstances. They need to foster experimentation through the exploration of innovative practices, 'rather than being seen to apply a non-existent best practice' (Ansell, Sørensen, and Torfing 2021, 956).

Hybrid professional managers who leverage these critical factors within their organizations have the potential to help them achieving adaptive resilience. Their formal membership, personal identification, and professional accountability within clinical communities of practice allow hybrid professional managers to be perceived as credible 'knowledge brokers' by their colleagues, particularly when compared to managers lacking a clinical background (Burgess and Currie 2013). As a reflection of the ingrained nature of their hybridity in between clinical and managerial domains, they can also enhance the absorptive capacity of the organization, that is, 'the ability to identify, assimilate, and exploit knowledge from the environment' (Jones and Fulop 2021, 6). It is also believed that their unique combination of competencies, legitimacy, and credibility allows them to positively influence fellow professionals (Bresnen et al. 2019; Burgess and Currie 2013; Veronesi, Kirkpatrick, and Vallascas 2014). In short, they are ideally positioned to lead the changes required to adapt their organization to the 'new normal' (Lega and Palumbo 2020; Leonelli et al. 2023).

Hybrid professional managers and UET

Previous studies have highlighted how hybrid professional managers are pivotal for the delivery of policy-driven change initiatives (Giacomelli 2020), due to their ability to frame organizational issues and objectives through 'two-way windows' (Llewellyn 2001), essentially by bridging traditionally siloed domains. Specifically, in the case of clinical directorates, hybrid professional managers can act as intermediaries between the realms of medicine and management. Their unique position enables them to fill the gap between professional frontline and managerial domain (Burgess and Currie 2013). As such, they potentially possess the ability to facilitate the exchange of both internal and external knowledge, fostering collaboration and knowledge sharing among professionals as well as the broader organizational workforce. Jones and Fulop (2021) describe this as 'translation work', in the sense that hybrid professional managers can be the fulcrum 'between domains and forms of knowledge', (p. 3).

An increasingly popular research stream has focused on the individual characteristics of hybrid professional managers that can positively influence the achievement of organizational objectives, on the premise that managers make decisions based on their own interpretation of situations, which are influenced by their values, knowledge, and experiences. Accordingly, some studies suggest that the presence of clinically qualified managers in hospital governing boards positively influences organizational performance (Kirkpatrick, Altanlar, and Veronesi 2023; Veronesi, Kirkpatrick, and Vallascas 2014). Similarly, Sarto et al. (2019) highlight how, within the Italian healthcare system, the inclusion of hybrid professional managers has a positive effect on service quality. Likewise, research carried out in other healthcare systems across Europe, such as Belgium (De Harlez and Malagueño 2016) and Germany (Kuntz, Pulm, and Wittland 2016), yields comparable findings. Moreover, looking at the US hospital sector, Goodall (2011) emphasizes the importance of having CEOs with a clinical background to achieve better organizational outcomes.

Beyond the empirical evidence, there are compelling theoretical reasons to believe that the characteristics and experiences of hybrid professional managers will have

positive consequences for the performance of healthcare organizations. UET (Hambrick and Mason 1984) is founded on the principle of bounded rationality – the concept that situations characterized by informational complexity and uncertainty are not objectively 'knowable', but rather subject to interpretation (Mischel 1977). Its central tenet consists of two interconnected parts: the first one suggests that managers act on the basis of their individually tailored interpretations of strategic situations, and the second one highlights how these interpretations are influenced by managers' experiences, values, and personalities (Hambrick 2007). Consequently, strategic decisions largely reflect the attributes of organizational leaders (Sanders and Carpenter 1998), and the influence of these individual characteristics becomes greater as decisions become more complex (Z. Zhang, Wang, and Jia 2020).

Empirical applications of UET have generally focused on decision-makers' demographic and background characteristics such as age, gender, education, career choices, and socioeconomic provenance. This is not because individual characteristics per se are meant to affect decisions. Rather, these are used as apparent indicators of the unobservable constructs that are believed to shape upper echelon executives' interpretations of reality, such as their values, cognitive models, personality and other psychological factors (Anessi-Pessina and Sicilia 2020). Thus, Esteve et al. (2013) posit that the age of governing directors influences their decision-making, as younger managers may be more willing to make risky decisions and more capable of developing and implementing new ideas and creative behaviour (Chown 1960; Daboub et al. 1995; Popli, Ahsan, and Mukherjee 2022). Incidentally, these are key skills in the pursuit of organizational adaptive resilience. Similarly, Wang et al. (2016) suggest that, because their cognitive schemas have had more time to mature and solidify, older managers might be less willing or able to learn and integrate new information quickly, with implications for organizational responses to a crisis.

Other studies based on UET have focused on the educational background of senior executives (e.g. De Cesari, Dutordoir, and Mehmood 2023). Education is likely to influence decisions because it contributes to a manager knowledge and skill base (Hambrick and Mason 1984). In the case of hybrid professional managers, the existing body of literature shows the advantages associated with providing management training to physicians in hybrid roles (Atun 2003; Kurunmäki 2004). Such training offers physicians a deeper understanding of management principles, enabling them to acquire valuable insights in the intricacies of day-to-day management situations. By equipping physicians with this knowledge, organizations can enhance their ability to navigate complex managerial challenges in complex and unstable environments.

Furthermore, it has been suggested that female managers, compared to their male counterparts, tend to involve stakeholders and co-workers more in the general decision-making process (Fox and Schuhmann 1999). Meier, O'Toole, and Goerdel (2006) argue that female executives manage organizations in a more flexible and participatory manner, while male managerial styles tend to be more hierarchical and rigid (Esteve et al. 2013). Accordingly, in times of crisis, female managers are found to be more inclined to openly communicate and collaborate, recognize and respond to others' emotions, as well as quickly adapt to challenging situations (Sergent and Stajkovic 2020). All these positive features associated with female managers are theoretically more suitable to achieve organizational adaptive resilience.

According to UET, another relevant characteristic is the experience accrued by an individual within the organization. Previous experience in the focal organization

provides a senior manager with an opportunity to learn about opinions and collective beliefs regarding the organization's relationship with the external environment (Berns and Klarner 2017; Zhu, Hu, and Shen 2020). A deeper understanding of the organization's strengths and weaknesses can, therefore, offer a senior manager a stronger base to make decisions leading to adaptive resilience. Finally, role-specific experience, i.e. experience as a manager, is also likely to positively impact decision-making (Engels, Fischer-Kreer, and Brettel 2022; You et al. 2020). Previous experience with management tasks may have exposed senior managers to a variety of complex and unforeseen situations, developing their ability to make quick and informed decisions even under conditions of uncertainty and pressure. This is particularly crucial in the case of hybrid professional managers, where accumulated management experience can help them make more effective decisions given lack of specific education and training in management (Llewellyn 2001). Thus, role-specific experience can also potentially lead to higher levels of organizational adaptive resilience.

Methods

To conduct our analysis, a two-stage approach was followed. In the first stage, a measurement of organizational adaptive resilience was obtained using a component of the Malmquist Productivity Index (MPI) based on data envelopment analysis (DEA). The MPI is widely used in healthcare studies as a further analytical step following DEA because it allows to compare different points in time (Coelli, Rao, and Battese 1998; Kohl et al. 2019). Since the MPI measures global change in productivity, we used an MPI subdimension (catching-up effect) to isolate and detect organizational adaptive resilience retrospectively. In the second stage, the combination of a hybrid professional manager's demographic and background characteristics related to high levels of organizational adaptive resilience was investigated through a fsQCA methodology.

Research setting and data sources

Among European countries, Italy was one of the first to face the COVID-19 health crisis, while having lower staffing levels and bed availability than other healthcare systems and with profound differences between regions in their ability to meet the population's need for care (Gigio et al. 2022). As stated, the data presented in this study refer to the public clinical laboratories situated within the hospitals of the Veneto Region. The total number of laboratories amounted to 39 but, due to missing data, the final sample size employed in this study consisted of 34 laboratories (87%). The primary objective of clinical laboratories during the COVID-19 emergency, in accordance with the triple T (test, trace and treat) policy implemented by the Veneto Region, was to achieve the maximum possible number of infection tests analysed. The purpose was to identify outbreaks and the spread of infections, initiate appropriate lockdown procedures if necessary and keep infected patients in isolation.

The database was compiled using a combination of sources. Specifically, information at the organization level was derived from a unique dataset provided by Veneto Region's management control office. These data (such as operating costs, total revenues, full-time equivalent number of medical, nursing, technical and administrative

staff) relate to the year before the emergence of the COVID-19 pandemic (2019). The hybrid professional managers' demographic and background characteristics were collected by looking at their curriculum vitae, which must be uploaded on an organization's official website and kept up to date according to the Italian transparency normative.

Organizational adaptive resilience assessment

The measurement of organizational adaptive resilience has empirically been undertaken in management research through a wide array of definitions and methodologies (Hillmann and Guenther 2021). The design of this study relied on available secondary data and assessed organizational adaptive resilience as the ability to maintain or recover high level of productivity when faced with environmental pressures and uncertainties (Boin and Van Eeten 2013).

Data envelopment analysis

DEA is a nonparametric method based on linear programming for evaluating the efficiency of a given sample of similar decision-making units (Charnes, Cooper, and Rhodes 1978) (DMUs). DEA and its various extensions have been used to assess resilience across a multitude of contexts (e.g. Azadi et al. 2023; Nazari-Shirkouhi et al. 2023; Villano et al. 2020; Zhou, Liu, and Fan 2020). One of the main advantages of this approach is that it allows to estimate production frontiers and to assess the relative efficiency of DMUs, here the clinical laboratories, by combining the input consumed and the output produced without assuming an a priori functional form among them. In the present study, the input/output selection was based on the extensive literature review on healthcare made by Kohl et al. (2019) and the data availability. The MPI based on DEA was calculated using the following inputs: depreciation and equipment fees, operating costs, full-time equivalent of medical, nursing, technical and administrative staff; and the following outputs: number of analyses and revenues from activities for the emergency department, other hospital departments, and for outpatients.

In 2020, the public clinical laboratories of the Veneto Region consisted of an average of approximately 32 full-time equivalent (FTE) employees, comprising around 3 medical staff, 6 nursing staff, 4 administrative staff, and 19 technical staff. Furthermore, the mean operational expenditure amounted to approximately EUR 5 million. In terms of their activity, these laboratories provided an average of about 1,478,000 analyses per year. This included 567,000 analyses for other departments, 792,000 analyses for outpatients, and 119,000 analyses for the emergency department.

The DEA algorithm assigns a score between 0 and 1 to each DMU, with 1 indicating the most efficient units and zero the less efficient units. Units with a score of 1 lies on the efficiency frontier that is composed of the set of all efficient units and represent the maximum level of efficiency achievable. However, DEA scores are relative to the sample used. This means that the efficiency values depend on the reference units. For example, a laboratory can have an actual decrease (increase) in productivity in t_{+1} but still receive an increase (decrease) in the DEA score if the other reference units show a stronger productivity drop (growth). Hence, one would not know if a change in efficiency was due to a change in performance of the DMU itself, or due to a shift of the frontier. For this reason, the MPI was introduced as DEA subsequent analysis as it is

more suitable for assessing a managerial action, a policy reform, or when it is necessary to run analyses at multiple points in time before and after an event (Färe et al. 1994; Kohl et al. 2019). The novelty of our empirical approach specifically lies in leveraging the 'catching-up effect' component of the MPI to assess the adaptive resilience of organizations.

Malmquist productivity index

The MPI measures the total factor productivity change between two data points of a particular organization in two adjacent time periods (Coelli, Rao, and Battese 1998). Its foundations are in the index based on the output distance function laid by Malmquist's work (1953), then developed in a multi-input and multi-output productivity index (Caves, Christensen, and Diewert 1982). The MPI obtains an efficient frontier based on the DEA scores and each unit is then compared according to its distance from the frontier by calculating the ratio of distances between each data point in time t and in time t_{+1}. Specifically, the MPI measures the productivity change between period t and t_{+1}. It declines if MPI < 1, remains unchanged if MPI = 1 and improves if MPI > 1.

One of the most relevant aspects of this index lies in the fact that it can distinguish productivity change in two components: technological change and technical efficiency change. The distinction is of utmost importance because high technological progress can co-exist with deteriorating technical efficiency due to a lower ability to manage resources and vice versa.

$$\text{Malmquist Index} = \text{Technical Efficiency Change}\,(\textit{catching up effect}) * \text{Technological Change}\,(\textit{innovation effect})$$

Technological change refers to the rate of productivity improvement that is due to the technological progress within the sector (Niesten 2010; Odeck 2000). It captures the technological innovation degree in two adjacent periods (Lin, Wu, and Yang 2023; Luo et al. 2019). It is also called the 'frontier shift' or 'innovation effect' because the introduction of a new effective technology, for example by early adopters' units, can move the frontier of the feasible efficiency points (Asmild and Tam 2007). In the context of clinical laboratories, a concrete illustration of this effect can be observed through the implementation of advanced machinery and equipment (Holland and Davies 2020). In essence, the term 'frontier shift' signifies the alteration in the efficient frontiers surrounding the DMU between the two specified periods (X. Zhang, Tone, and Lu 2018). Laggard units, keeping stable their level of productivity of time t, will see a decrease in relative productivity in time t_{+1} because they delay the technology introduction. Over time, most of the organizations in the sector will adapt to the technological progress by increasing their technology-related productivity, thereby closing the gap.

The productivity change is not due only to technological progress, but also to the way technology is employed, the 'technological mastery', and how inputs are combined and managed. Technical efficiency change refers to productivity change due to learning by doing, diffusion of knowledge, improved managerial practices and short run adjustment to external shocks (Nishimizu and Page 1982). It is also called catching-up effect because it evaluates the ability to approach the frontier with a given level of technology. In other words, it captures changes in productivity over time that arise from the DMU's operational ability to efficiently reorganize its factors (Walker 2018).

Consistent with the study's aim, the caching up effect was isolated, so excluding the frontier shift effect. The rationale behind this decision is rooted in the recognition that the frontier shift effect is subject to the influence of multiple factors predominantly originating from sources external to the DMU and encompassing the entire industry (Sueyoshi and Goto 2013). They include, for instance, investments in specific machinery and equipment technologies or infrastructure (Sowlati and Vahid 2006). These factors do not fall within the scope of organizational adaptive resilience, which, as highlighted by Kendra and Wachtendorf (2003), belongs to adaptive behaviour that is not reliant on specific physical facilities or technological systems. Under the time and resource constraints organizations were operating during the pandemic, it would have been extremely difficult to achieve meaningful technological progress. The catching up effect, therefore, assesses the ability of clinical laboratories to enhance their capacity for re-organizing resources in order to address the challenges posed by the pandemic.

The fuzzy-set Qualitative Comparative Analysis (fsQCA)

In the second stage, a fsQCA approach was employed to investigate whether hybrid professional managers' characteristics had a potential combined effect on organizational adaptive resilience. The choice of the method of analysis is related to the characteristics of the phenomenon. The rapid diffusion of viral infections and the ensuing pandemic created complex challenges for all organizations with few or no best practices to rely on. In the case of the public laboratories, their senior managers had to develop new procedures and responses to meet the volume of tests requested. In such a complex situation, looking for mono-causal explanations for a given outcome as in regression models may lower the richness of the findings. Therefore, instead of analysing the net effects of individual hybrid professional managers' characteristics, the study aimed to determine which configurations (i.e. combinations of hybrid professional manager characteristics) led laboratories to be more adaptively resilient in dealing with the challenges of the pandemic. In other words, a configuration represents a causal recipe of antecedents or conditions that interact in complex ways to produce specific outcomes (Fiss 2011).

Being rooted in Boolean algebra, FsQCA has three key features: i) conjunctural causality, meaning that it is possible to have combinations of causal conditions (e.g. demographic and background characteristics of heads), instead of a single condition, linked to an outcome (organizational adaptive resilience); ii) asymmetric and equifinal solutions for a given outcome, which allow to identify complex (i.e. non-linear and non-additive) causal patterns and where more than one casual condition combination (configurations) can lead to the outcome; iii) and causal asymmetry, which means that single conditions or configurations leading to high levels of the outcome are not the mirror opposites of conditions or configurations leading to low levels of the outcome. Therefore, if a casual condition leads to high organizational adaptive resilience, it does not mean that its absence leads automatically to its opposite. In addition, fsQCA can analyse potential combined effects on a small sample size (Rihoux and Ragin 2009; Schneider and Wagemann 2012).

The causal conditions

The demographic and background characteristics of hybrid professional managers are reflected in five causal conditions. The first condition is AGE, operationalized by

calculating the age of the head in 2020. The second condition is MANAGERIAL EDUCATION. This is operationalized by using a dummy variable with a value of 1 if head has had managerial training, i.e. if they have attended formal courses in management, 0 otherwise. The third condition is GENDER, operationalized with a dummy variable: 1 if Female, 0 otherwise. The fourth condition captures the ORGANIZATIONAL TENURE. It is operationalized as the sum of the years the head has spent in that organization, regardless of the position held. The fifth condition refers to the MANAGEMENT EXPERIENCE, namely the number of years the individual has spent as manager.

The FsQCA procedure

FsQCA involves three main steps: a) the calibration of the outcome variable and the causal conditions, b) the creation and refinement of the Truth table and c) the analysis of necessary and sufficient conditions (Fiss 2011). The calibration process enables to transform raw data into fuzzy-set membership scores between 0 and 1. A decision about full membership and non-membership needed to be made assessing what levels of the causal conditions and outcome were considered high versus low (Greckhamer et al. 2018).

According to Ragin (2008), membership scores should reflect external standards based on substantive knowledge and the existing literature. Nevertheless, when external standards and substantial knowledge are not available, a mechanistic calibration method based on sample percentiles is preferred and widely adopted by scholars (De Crescenzo, Ribeiro-Soriano, and Covin 2020). Therefore, following the calibration process used by Andrews, Beynon, and McDermott (2019), three anchors are fixed to calibrate the continuous variables, i.e. organizational tenure, age and management experience: the 5th percentile is the point of full non-membership, the 50th percentile is the cross-over point, and the 95th percentile is the point of full membership. Likewise, the outcome variable was calibrated by utilizing the 5th percentile as the threshold for non-membership and the 95th percentile as the threshold for full-membership. The value of 1 was designated as the cross-over point, signifying a state where productivity remained unchanged (Kohl et al. 2019) (see Table 1).

A Truth Table identified all the logically possible combinations of the hybrid professional manager characteristics ($2^k = 32$, k being the number of characteristics = 5) that lead to organizational adaptive resilience. According to the literature, the truth table was refined through specification of a minimum frequency of one observation and a consistency cut-off of 0.8. In practical terms, the configurations considered

Table 1. Descriptive statistics and fuzzy set calibration.

	Descriptive Statistics					Fuzzy set calibration		
	Obs	Mean	Std. Dev.	Min	Max	Fully out	Crossover point	Fully In
Org. Adapt. Res.	34	1.117	0.280	0.339	2.017	0.877	1	1.529
Age	34	59.529	5.247	50	67	50	60	66.35
Managerial Educ	34	0.265	0.448	0	1	0.05		0.95
Gender	34	0.412	0.499	0	1	0.05		0.95
Organizational Tenure	34	18.264	8.928	4	32	6.6	18.5	31
Management Experience	34	21.088	8.635	10	34	10	20	33

in the analysis had to include at least two clinical laboratories with a consistency of at least 0.80 (Fiss 2011). Necessary and sufficient conditions analyses were run using the fsQca 4.1 software.

Finally, a series of robustness tests were undertaken. One robustness analysis focused on the outcome variable, which was transformed into a dichotomous variable indicating whether the catching-up effect exceeded or fell below a value of 1. Other additional analyses were conducted involving modifications to the anchor thresholds of both the antecedents and the outcome. These robustness checks reinforced the validity of the findings, with qualitatively similar results.

Results

The descriptive statistics are presented in Table 1. Approximatively, 41% of the hybrid professional managers were women, on average 60 years old, and with significantly high seniority in term of both organizational tenure (18 years) and management experience (20 years). The clinical laboratories had an average organizational adaptive resilience higher than one (1.117), showing a positive ability to absorb shocks and react to the crisis.

Following the best practice standards proposed by Schneider and Wagemann (2010), the tests for necessary conditions are first presented before moving to the analysis of sufficient conditions. A condition is necessary when the corresponding consistency score exceeds a threshold of 0.90 (Callens and Verhoest 2023). Table 2 shows that all values are below the 0.90 cut-off, which means that none of the conditions were necessary.

Table 3 presents the findings of the 'sufficiency analysis' used to interpret the intermediate and parsimonious fsQCA solutions. The conventional marks introduced by Ragin and Fiss (2008) were adopted. A black circle (●) indicates the presence of a condition, a crossed-out circle (⊗) indicates the absence of a condition, and a blank space refers to a 'don't care' situation, meaning that a condition may be either present or absent. Furthermore, we used a convention introduced by Fiss (2011) relating to the core and peripheral conditions, and respectively referring to the large and small circles. Fiss (2011) suggests that a condition should be considered core when it appears in both intermediate and parsimonious solutions, but it is regarded as peripheral when it only

Table 2. Necessary conditions analysis.

	Organizational Adaptive Resilience		~ Organizational Adaptive Resilience	
	Consistency	Coverage	Consistency	Coverage
Age	0.748115	0.765432	0.787385	0.571502
~ Age	0.581197	0.793956	0.676825	0.655907
Managerial Education	0.284565	0.577551	0.404678	0.582653
~ Managerial Education	0.794369	0.652893	0.706591	0.411984
Gender	0.537959	0.748252	0.366407	0.361538
~ Gender	0.540975	0.546193	0.744862	0.533503
Organizational Tenure	0.679236	0.776883	0.568391	0.461185
~ Organizational Tenure	0.528909	0.633353	0.725018	0.615894
Management Experience	0.507290	0.639822	0.758327	0.678504
~ Management Experience	0.745098	0.812946	0.597449	0.462425

Note: Legend.
~ indicates low levels (absence) of the condition.

Table 3. Sufficiency analysis.

	Organizational Adaptive Resilience				~ Organizational Adaptive Resilience	
Configurations	1	2	3	4	L1	L2
Age	●	●		⊗	●	⊗
Managerial Educ	⊗	⊗	⊗	⊗	⊗	●
Gender		●	●	●	⊗	●
Organizational Tenure	●	●	●	⊗		●
Management Experience	●		●	⊗	●	⊗
Consistency	0.892	0.880	0.857	0.942	0.881	0.859
Raw coverage	0.246	0.338	0.239	0.178	0.308	0.142
Unique coverage	0.054	0.146	0.047	0.056	0.198	0.032
Number of cases	2	5	6	3	2	1
Solution coverage			0.515		0.340	
Solution consistency			0.877		0.848	

Note: Legend.
●• = Core condition present.
⊗ = Core condition absent.
• = Peripheral condition present.
⊗ = Peripheral condition absent.
Blank = Irrelevant.

appears in the parsimonious solution. Core elements indicate a strong causal relationship with the outcome, while peripheral elements point to a weaker relationship. A configuration is defined sufficient when its consistency measure exceeds a threshold of 0.8 (Ragin 2008). In line with Pham and Lo (2023), the indicators of the model fit are as follows: consistency equal to or above 0.75; unique coverage above 0; and solution consistency above 0.6. Table 3 shows that all configurations are above the described thresholds and, hence, the results have a good model fit.

The findings reveal that four distinct profiles of hybrid professional managers foster the achievement of organizational adaptive resilience during a period characterized by high complexity and instability, whereas two other profiles lead their organizations to low levels of the chosen outcome.

As shown in Table 3, since there are no single-condition configurations, individual characteristics need to be integrated and complemented by the other traits to attain high (and low) levels of organizational adaptive resilience. Among configurations of hybrid professional managers' characteristics linked to high organizational resilience, Configurations 2 and 3 share the common trait of featuring female managers with extended organizational tenure and no formal management education. However, Configuration 2 is characterized by having older managers regardless of their experience, while Configuration 3 emphasizes the importance of high levels of management experience regardless of age. Moreover, Configuration 4 comprises young female hybrid professional managers with limited experience and no managerial education. Lastly, Configuration 1 identifies the managerial profile of an older, experienced, individual without formal managerial education, but with long organizational tenure.

In relation to the configurations linked to low levels of organizational resilience, L1 identifies male managers with high management experience but no managerial education. Yet, L2 shows the profile of a young female hybrid professional manager with managerial education and long organizational tenure, but low management experience.

Discussion

The theoretical foundation of this article lies in UET. It is grounded on the premise that managers are subject to bounded rationality, meaning that complex and uncertain situations are not objectively knowable but rather, are merely interpretable (Hambrick 2007). This is heightened during a crisis, when time constraints and available resources do not allow for a complete and accurate analysis of every available alternative (Parnell 2020). However, the degree to which bounded rationality constrains managerial decision-making varies significantly (Hambrick and Brandon 1988). Indeed, as UET suggests, the ability to interpret different situations is filtered by a manager's unique experiences, values and personality (Hambrick and Mason 1984). This reliance on subjective factors in the interpretation of emerging situations becomes particularly pronounced during periods of turbulence, when managers tend to favour cognitive shortcuts to cope with uncertainty and simplify complex tasks (König et al. 2020; Schaedler, Graf-Vlachy, and König 2022).

Our findings reveal the specific combinations of experiences, values, and personality traits that lead hybrid professional managers to a superior (inferior) situational interpretation. These individual interpretations, in turn, influence hybrid professional managers' decisions, ultimately shaping their ability to foster (hinder) organizational adaptive resilience. In this sense, the results align with Díaz-Fernández, González-Rodríguez, and Simonetti (2020), who suggest that different combinations of managerial attributes generate distinct profiles that exert alternative impacts on organizational performance. Furthermore, they validate the appropriateness of employing fsQCA, as this enables a comprehensive examination of the complexity inherent in the phenomenon under investigation.

We first look at the configurations of characteristics exhibited by hybrid professional managers that are linked with higher organizational adaptive resilience. Here, the presence of female managers emerges as a relevant factor in three configurations, while in one configuration gender is non-relevant. This supports previous research (Esteve et al. 2013; Meier, O'Toole, and Goerdel 2006) which shows that the less hierarchical and more flexible decision-making style of female managers, compared to their male counterparts, can contribute to positive organizational outcomes (including adaptive resilience). Therefore, for a manager the attribute of being a female, previously identified as important in contexts of relative stability (Anessi-Pessina and Sicilia 2020), also appears to hold relevance during periods of uncertainty and increased complexity.

Having said that, although female leaders are likely to possess flexible and participatory management styles, they may encounter limitations in exercising their managerial power, due to system-wide factors like gender-based discrimination and implicit bias (Mui and Hill 2023). Nonetheless, while this could certainly happen in stable circumstances, during emergencies like the COVID-19 pandemic, conditions may shift rapidly (Aldrich and Lotito 2020), empowering hybrid professional managers (especially female leaders) to fully exercise their managerial prerogatives, and thus their discretion and power, to positively respond and adapt to the emergent situation (Leonelli et al. 2023).

Nonetheless, the analysis also suggests that gender needs to be complemented by other demographic and/or background attributes to generate adaptive resilience. In particular, in Configurations 2 and 3, it emerges that the organizational tenure of

hybrid professional managers is also relevant. As emphasized by Zhu et al. (2020) and Berns and Klarner (2017), having extensive organizational tenure equips managers with a deeper understanding of the specific processes, resources, and challenges faced by their organization. Combined with the other attributes, this specialized knowledge appears to assume critical importance in making informed and strategic decisions in complex and uncertain times.

The managerial characteristics highlighted by the analysis have the potential to serve as catalysts for key features of adaptively resilient organizations (Turner 2022). First, the adoption of a less hierarchical decision-making style, commonly observed among female managers (Esteve et al. 2013), can facilitate the process of adapting to emerging challenges by proactively engaging in dialogue with employees and stakeholders. This may enable the integration of different perspectives and insights, thereby allowing the generation of practical solutions through collaborative efforts to overcoming the crisis (Sergent and Stajkovic 2020). Also, a high level of organizational knowledge can enhance a manager's ability to successfully reshape the allocation of resources, interpersonal processes, and organizational routines to respond to disruptive events (Zhu, Hu, and Shen 2020). Accordingly, by leveraging their extensive organizational knowledge, it is likely that hybrid professional managers will be able to identify where adaptation is mostly required and dynamically reallocate resources to facilitate the devising of timely and effective solutions (Ansell, Sørensen, and Torfing 2021).

Combined with the above features, Configuration 2 reveals a further characteristic which can lead to higher levels of organizational adaptive resilience: the relative higher age of the head of the clinical laboratory. Here, the flexibility and non-hierarchical decision-making typical of female managers (Fox and Schuhmann 1999; Meier, O'Toole, and Goerdel 2006), coupled with a deeper understanding of the organization (Berns and Klarner 2017; Zhu, Hu, and Shen 2020), allows to make effective use of a more cautious approach to risk taking often associated with older managers (Hambrick and Mason 1984; Popli, Ahsan, and Mukherjee 2022), which can potentially lead to avoid committing to overtly risky strategic and operational decisions especially during times of heightened uncertainty and complexity.

Furthermore, in alignment with Configuration 2, Configuration 3 emphasizes the importance of the presence of a female hybrid professional manager with extensive organizational tenure. These characteristics are combined with substantial management experience to achieve high levels of adaptive resilience, while the age of the manager does not seem to be relevant. This finding appears to corroborate the existing literature pointing out the positive role played by management experience in achieving organizational objectives (Engels, Fischer-Kreer, and Brettel 2022; You et al. 2020). Essentially, heads of clinical laboratories can tap into a wealth of knowledge and insights gained from their past experiences, enabling them to make comparatively well-informed decisions within a limited timeframe even in situation of crisis (Turner 2022).

Moreover, Configuration 4 points out how being a relatively young, female manager, in the absence of extensive management experience or organizational tenure, is a sufficient combined condition to successfully lead the organization towards adaptive resilience. This seems to align with the idea that participating in decision-making and being flexible, characteristic of female managers (Meier, O'Toole, and Goerdel 2006), along with the creative problem-solving abilities of younger managers (Anessi-Pessina

and Sicilia 2020), can be important antecedents of organizational adaptive resilience. The latter can be triggered by these managerial traits that encourage active collaboration between colleagues, facilitate internal and external stakeholder involvement and stimulate creativity and innovation (Esteve et al. 2013; Sergent and Stajkovic 2020). In this regard, a creative climate is believed to be indispensable in providing an environment conducive to organizational adaptation and transformation in the face of challenges (Barasa, Mbau, and Gilson 2018).

Finally, Configuration 1 profiles a head of a clinical laboratory who, irrespective of gender, is of a relatively advanced age, has extensive management experience and a longer tenure within the organization. This configuration appears, as a consequence, to further confirm the importance of how an in-depth knowledge of the organization (Zhu, Hu, and Shen 2020), coupled with extensive management experience (Engels, Fischer-Kreer, and Brettel 2022), enables hybrid professional managers to find solutions which can benefit from the general risk adversity normally associated with older managers (Daboub et al. 1995; Esteve et al. 2013; Wiersema and Bantel 1992). Furthermore, these combined characteristics are likely to enhance the ability of hybrid professional managers to operate across professional and managerial domains. Their deeper understanding of the available resources, combined with lessons learned from their accumulated management experience, could make them more effective in connecting, recombining, and translating managerial and professional knowledge across different individuals and groups within and outside the organization (Kislov, Hodgson, and Boaden 2016).

However, rather surprisingly and in contrast with previous findings (Esteve et al. 2013), all configurations suggest the absence of formal managerial education as a key antecedent of organizational adaptive resilience. In other words, in our study the lack of formal management training is a common condition among hybrid professional managers who lead their organizations towards high levels of adaptive resilience. It would appear that, during periods of increased complexity and instability, hybrid professional managers rely more on their wealth of experiential knowledge, together with their expertise of clinical matters, rather than on the knowledge and skills acquired through formal management education. Furthermore, educational programmes that overemphasize specific practices or processes may hinder managerial adaptability. Excessive reliance on set managerial approaches could hinder the ability to respond to novel situations requiring flexible solutions. Additionally, overconfidence arising from extensive training can foster complacency or resistance to embracing alternative solutions when faced with unforeseen circumstances (Mishra and Metilda 2015).

As shown in Table 3, Configuration L2 suggests that the presence of management education may potentially hinder the problem-solving abilities typically associated with younger managers (Daboub et al. 1995; Esteve et al. 2013; Wiersema and Bantel 1992) and the more flexible decision-making capabilities often exhibited by women (Meier, O'Toole, and Goerdel 2006). The quality of the management training provided is also likely to be substandard, possibly due to its fragmented structure and the perception among doctors that it serves more as a formal credential rather than a comprehensive preparation for effectively fulfilling the responsibilities of hybrid professional managers.

An alternative reason that might explain why female leadership in this configuration leads to low levels of organizational adaptive resilience could be related to the

context of individual organizations. There may be specific cultural and organizational characteristics that inhibit female leadership (Offermann and Foley 2020), such as gender discrimination, implicit biases, and unfair performance evaluations. While one might expect that the authority associated with such positions would, to an extent, provide a protective shield, women in leadership positions may be particularly susceptible to discrimination due to backlash, heightened scrutiny and criticism.

Finally, Configuration L1 points to the downsides, from the perspective of achieving higher levels of organizational adaptive resilience, of having a relatively older, male manager who is more likely to exhibit resistance to change and relying on well-rehearsed and trusted, but ultimately inflexible, mental schemas (Anessi-Pessina and Sicilia 2020; G. Wang et al. 2016).

Conclusions

Building on UET, this paper has sought to enhance the understanding of individual attributes of hybrid professional managers that have led to adaptive resilience of public sector organizations during the COVID-19 pandemic. Specifically, the study focuses on the illustrative case of 34 publicly owned clinical laboratories in the Veneto region during the initial wave of the pandemic in 2020. The analysis suggests that organizational adaptive resilience can be achieved through different combinations of demographic and background characteristics of hybrid professional managers. Notably, the findings highlight the significance of being a female manager and having a substantial tenure within the organization. Somehow surprising, having prior management education is revealed as a condition that negatively affects the organization's ability to achieve adaptive resilience.

Contributions and implications

The findings reported above have potentially wide-ranging implications for theory, research, policy and practice. Concerning theory, they contribute to the predictions of UET by adopting a configurational approach to investigate the influence of combinations of individual managerial traits on organizational adaptive resilience. Specifically, there are several ways in which integrations and combinations of cognitive frames (i.e. knowledge, skills, values and beliefs) of a hybrid professional manager can interactively influence his or her choices. Such integrations and combinations mirror the cognitive framework and behavioural preferences of a hybrid professional manager, thereby broadening UET by encompassing a more holistic insight into the heterogeneous and complex nature of managerial cognition. Through this approach, our understanding goes beyond conventional linear models as it considers the interconnection and interplay of different managerial characteristics in shaping organizational outcomes.

In relation to research, while previous studies on hybrid professional managers in the healthcare sector have examined their demographic and background attributes in relation to specific organizational outcomes in complex and stable environments, this study has focused on a context shaped by heightened complexity and unprecedented instability resulting from the disruptiveness of the COVID-19 pandemic. We highlight the existence of various profiles of hybrid professional managers and conclude that there is no singular best solution concerning the combination of demographic and background attributes that foster organizational adaptive resilience. Any individual

characteristic of a hybrid professional manager may yield either a positive or negative effect on the outcome, contingent upon its interaction with other managerial traits. It is, therefore, this combination of individual attributes that should be looked at rather than focusing uniquely on direct effects of any characteristic.

In relation to the body of literature on organizational adaptive resilience, our study confirms the relevance of managers, on top of other determinants explored in previous research, in overcoming a crisis (Ansell, Sørensen, and Torfing 2021). In particular, we highlight how an organization's ability to respond to disruptive events, which depends on certain key factors such as flexibility, trust, collaboration and experimentation (Turner 2022), is a reflection of the profile of the manager responsible for making the key strategic and operational decisions. Thus, through the lens of UET and the configurational approach adopted, we have offered evidence on how combinations of a hybrid professional manager's cognitive frames can either facilitate or impede the development of formal and informal practices that foster organizational adaptive resilience (Boin and Van Eeten 2013).

In terms of implications for policy and practice, our findings underline the importance of hybrid professional managers possessing a deep understanding of their organization to foster adaptive resilience. Thus, we suggest that policy makers should prioritize vertical professional growth, placing emphasis on the appointment of managers who possess extensive knowledge of the organization rather than recruiting from the outside. This requires human resource planning to allow for the internal development of future leaders and nurture their career progression from within the organization. In this manner, they will be able to acquire the necessary skills and experience to make informed and effective decisions when faced with emergency situations (as well as in normal times). Moreover, the findings concerning the gender of managers indicate the need for policy makers to further develop labour policies that support and empower women in applying for and being appointed to managerial positions. Of course, this needs to be coupled with policies that protect female leaders from bias and discrimination and provide fair evaluations of their performance in the role (Offermann and Foley, 2020).

Lastly, our findings strongly suggest introducing modifications to the existing managerial courses, at least in the context of the Veneto Region (and Italy more broadly). The course offering for professionals currently does not equip them effectively with both theoretical knowledge and practical managerial skills, leaving them to develop their managerial preparedness and expertise by learning on-the-job. To an extent, the findings seem to suggest that female hybrid professional managers can overcome poor training quality through their flexibility and adaptability in management style (e.g. Sergent and Stajkovic 2020). However, while definitive conclusions remain elusive, the development of targeted educational interventions, meticulously tailored to the unique requirements and obstacles faced by healthcare organizations and their managers, may hold the potential to empower (male and female) managers to effectively navigate the turbulence faced in crisis events.

Future research

While offering valuable insights, we acknowledge the inherent limitations of using a relatively small sample size (34 public clinical laboratories). This aligns with fsQCA's strength in enabling in-depth analysis and inductive reasoning with smaller datasets

(Schneider and Wagemann 2012), but also has implications for the generalizability of the findings.

Hence, it would be interesting to validate our findings by conducting studies in other public services heavily affected by the pandemic, such as education or other departments of hospitals, such as pneumology or intensive care. This would enable a broader understanding of the impact of values, cognitive models, and personality factors of hybrid professional managers on organizational adaptive resilience within different contexts.

Additionally, our research focuses only on one Italian region. Thus, it would be worth exploring the influence of managers' individual characteristics in other Italian regions or in different healthcare systems by adopting a multi-country research design. Crucially, we also need to better understand the mechanisms and processes that allow these managerial characteristics to positively influence organizational adaptive resilience.

Future research efforts could also delve into the role played by the organizational culture and the functional imperatives of organizations, such as tension management, pattern maintenance, and adaptive capacity, which may hold crucial implications for organizational adaptive resilience (Beunen, Patterson, and Van Assche 2017). Specifically, further studies could investigate whether and how organizational cultures that embrace challenges as learning opportunities and foster creativity and innovation can enhance organizational adaptive resilience (see Barasa, Mbau, and Gilson 2018).

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