Federica Polo

Valorizing human capital for dynamic organizations through the triad of training-competency modeling-participation

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Julkaisun nimike
Dynaamisten organisaatioiden inhimillisen pääoman hyödyntäminen harjoittelun, osaamisen mallintamisen ja osallistumisen kautta

Tiivistelmä
Muuttuvassa ja kilpaillussa liiketoimintaympäristössä toimivien organisaatioiden on kehitettävä kyvykkyyksiä tiedon ja resurssien keräämiseen, integrointiin ja uusimiseen kilpailukyvyn säilyttämiseksi. Näitä kyvykkyyksiä on kuitenkin vaikea saavuttaa, sillä henkilöt, ryhmät ja itse organisaatio, jotka yhdessä muodostavat organisaation inhimillisen pääoman, jarruttavat kehitystä.
Tämä väitöskirja keskittyy inhimilliseen pääomaan ja erityisesti yritysten investointeihin strategisiin HR-käytäntöihin, joilla kehitetään korkeatasoista, ainutlaatuista ja yrityksen strategisiin tarpeisiin parhaiten sopivaa inhimillistä pääomaa. Tähänastisesta tutkimuksesta puuttuu malleja, joilla voitaisiin selvittää, miten HR-käytännöt johtavat inhimillisen pääoman kehitykseen organisaatioiden sisällä ja mitkä mekanismit ovat tärkeitä inhimillisen pääoman kehityksessä muuttuvissa liiketoimintaympäristössä. Tutkimuksen tavoitteena onkin ymmärtää, miten HR-käytännöt suosivat ja edistävät inhimillisen pääoman kehitystä muuttuvissa organisaatioissa. Väitöskirjassa analysoidaan kolmea HR-käytäntöä inhimillisen pääoman kehityksen mikroperustana: 1) osaamisen määritteleminen ja kehittäminen strategisena välineenä yksilöllisen osaamisen kohdistamiseksi organisaation tavoitteisiin, 2) koulutuskulttuurin rooli työntekijöiden rohkaisemisessa päivittämään osaamistaan ja 3) työntekijöiden osallistuminen organisaatiojärjestelyihin keskeisenä käytäntönä HR:n mukauttamisessa uusiin liiketoiminnan tarpeisiin. Kolmea käytäntöä analysoidaan viiden artikkelin avulla. Metodologisesti väitöskirja kehittää ad hoc -työkaluja, joita organisaatiot voivat käyttää sisäisten resurssien havaitsemiseen, hyödyntämiseen ja uudelleenjärjestelyyn inhimillisen pääoman kehittämiseksi ja kilpailukyvyn säilyttämiseksi muuttuvassa liiketoimintaympäristössä. Väitöskirja tukee kirjallisuutta ja käytäntöä ehdottamalla inhimillisen pääoman uutta käsitteellistämistä dynaamisena kyvykkyytenä sekä osoittamalla, miten HR-käytäntöjen käyttöönotto muuttuvassa ympäristössä vauhdittaa inhimillisen pääoman kehittämistä organisaatioissa luoden ainutlaatuisuutta sekä saavuttaakseen liiketoiminnan tavoitteet työntekijöiden kautta.

Asiasanat
Inhimillinen pääoma, HR-käytännöt, dynaaminen kyvykkyys, osaamisen mallintaminen, koulutus, organisaation uudelleenjärjestely

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Abstract

Organizations operating in a business environment, characterized by market changes and knowledge-based competition, need to develop capabilities to accumulate, integrate and renew knowledge and resources in order to remain competitive. However, these capabilities are difficult to achieve because they are held back by people, groups and the organization itself, which together constitute the human capital (HC) of the organization. This dissertation focuses on the HC and, in particular, on companies' investment in strategic HR practices to develop higher level and unique HC, best aligned with their strategic needs. Research to date lacks models able to examine how HR practices lead to HC development within organizations and which mechanisms play an important role in HC development in a business environment characterized by change. Therefore, the objective of this study is to understand how HR practices favor and contribute to HC development in changing organizations. To achieve this goal, this dissertation analyzes three main HR practices as the microfoundations of HC development: 1) the definition and development of competencies as a strategic tool to align individual competencies to organizational targets; 2) the role of a training culture in encouraging employees to update competencies and 3) the participation of employees in organizational restructuring as a key practice in aligning HR to the new business needs. The three practices are analyzed through the five articles included in this dissertation. From the methodological standpoint, this dissertation develops ad hoc tools that organizations can implement to sense, seize and reconfigure internal resources in order to develop HC and remain competitive in a changing business environment.

This study contributes to the literature and practice by proposing a new conceptualization of HC as a dynamic capability and showing how the implementation of HR practices in a changing environment give leverage for HC development within organizations to generate uniqueness and meet business objectives through employees.

Keywords

Human capital, HR practices, dynamic capability, competency modelling, training, organizational restructuring

«Qui, sul bordo di quello che sappiamo, a contatto con l'oceano di quanto non sappiamo, brillano il mistero del mondo, la bellezza del mondo, e ci lasciano senza fiato».

Sette brevi lezioni di fisica, Carlo Rovelli

"Here, on the edge of what we know, in contact with the ocean of the unknown, shines the mystery and the beauty of the world. And it's breathtaking."

Carlo Rovelli, Seven Brief Lessons on Physics

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This adventure started on a Monday in January 2016: I reached Vaasa on a very white and cold evening after crying for 12 hours and, when the tears were over, I opened my luggage and found a bottle of red wine, broken, and soaking into my belongings, including the bed linen in which I was supposed to sleep that night. In Italian, wet (bagnato) rhymes with lucky (fortunato), and this is how my story began: with a lot of luck.

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Vaasa, 2.12.2020

Federica Polo

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Abbreviations

HC	Human Capital
KSA	Knowledge Skills Abilities
HR	Human Resources
RBV	Resource-based view
TCS	Training Culture Scale

Publications

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[2] Polo, F., & Kantola, J. (2018). Valorizing the Human Capital Within Organizations: A Competency Based Approach. In: *Kantola J., Nazir S., Barath T. (eds) Advances in Human Factors, Business Management and Society. AHFE 2018.* Advances in Intelligent Systems and Computing, vol 783. (pp. 55–63). Springer, Cham.

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1 INTRODUCTION

1.1 Background to the research

Organizations operating in today's business environment, characterized as it is by market changes and knowledge-based competition, need to develop the capabilities to accumulate, integrate, and renew knowledge and resources in order to remain competitive (Wang, Jaw, & Tsai, 2012). However, these capabilities are difficult to attain because they are dependent on people, groups, and the organization itself, which together constitute the human capital (HC) of the organization (Subramaniam & Youndt, 2005; Dost, et al., 2016). This capital is the product of the individual capital, combined with the social capital and the organizational capital, and it represents the added value of the company in creating competitive advantage (Kaplan & Norton, 2004). Nevertheless, capital resources are alone not sufficient to create value; they must be aligned and integrated with the organizational processes (Youndt & Snell, 2004). Furthermore, changes and challenges at both the organizational and the individual level—such as the composition and diverse characteristics of the workforce, relocation and retraining of personnel, impact of new technologies, adaptability to change, transition from products to services—together with different individual values and workplace expectations, raise relevant issues in the organizations and impact on the implementation and management of processes and practices (Salas, et al., 2012) with possible negative consequences for organizations, which may lose valuable knowledge, skills, and core employees (Cascio, 2002). To adapt, and successfully survive these organizational and environmental contingencies and changes, organizations must implement effective human resource (HR) practices to reduce the negative effects (Wang, Jaw, & Tsai, 2012) and sustain superior performance (Kaplan & Norton 2006). Researchers agree that there are three crucial aspects in which organizations should invest to sustain competitive advantage: finance; products or markets; and human capital (Salas, et al., 2012).

This dissertation will focus on HC, and in particular on how companies should invest in strategic HR practices to develop higher-level and unique HC, closely aligned with their strategic needs (Carmeli & Schaubroeck, 2005). According to the literature, HC management practices are characterized by their fit with strategic goals, largely managing the HC of the organization to maximize its productivity and potential in creating value in dynamic environments (Wang, Jaw, & Tsai, 2012). Translated into practice, this means identifying ways to allow

employees to best develop and implement their knowledge, skills, and abilities in tasks and processes, matching the firm's strategic need to face organizational and environmental contingencies (Wright, Dunford, & Snell, 2001; Wang, Jaw, & Tsai, 2012). These strategies are often defined as high involvement systems and they consist of HR practices based on the enhancement and valorization of employees' knowledge, skills, and abilities, participation in work-related decisions and training in order to develop a company-specific HC to achieve better performance (Batt, 2002; Appelbaum, et al., 2000).

1.2 Research gap, research objective and questions

Over recent years, scholars and practitioners have increasingly directed their attention to the crucial role of HC management as leverage in influencing organizational performance (Grant, 1996; Hitt, et al., 2001), suggesting that organizations can utilize performance- and commitment-oriented HR practices to promote organizational effectiveness (Becker & Gerhart, 1996; Dyer & Reeves, 1995; Wright, Dunford, & Snell, 2001; Kehoe & Wright, 2013). Although such research plays an important role in highlighting the relationship between HR practices and organizational effectiveness (Osterman, 2006), few studies provide useful insights into organizations that want to invest in the development of HC through the implementation of HR practices to gain competitive advantage in a dynamic environment (Theriou & Chatzoglou, 2008; Delery & Roumpi, 2017).

Moreover, it emerges from previous research (Phillips & Phillips, 2014) that the approach adopted by scholars is mostly descriptive, indicating what HR practices do and describing their impact at various levels in the organization, but with a lack of empirical analysis to explain how better to implement HR practices in a changing environment, or how they could be improved and adapted to become instrumental in the company gaining competitive advantage through people (Theriou & Chatzoglou, 2008; Delery & Roumpi, 2017). The HR practices most commonly studied in the literature are timework planning, participation in decision-making, inclusive procedures of recruitment and selection, training, communication and involvement of employees, internal career development and broadly defined job descriptions (Batt, 2002). Nevertheless, the literature still lacks models able to examine how HR practices lead to HC development within organizations, and which mechanisms play an important role in a business environment characterized by change (Schuler & Jackson, 2007; Wright & Snell, 2009; De Winne & Sels, 2010; Delery & Roumpi, 2017). Recent studies tend principally to answer questions aimed at identifying the HR practices leading to optimal performance (Kehoe & Wright, 2013; Delery & Roumpi, 2017) and how to

fit HR practices to the business strategy (Wright & Snell, 2009). These questions are primarily oriented to tying HR practices to resource characteristics and, in turn, to organizational outcomes (Markova, 2012).

This research, however, aims to extend this perspective in identifying the process whereby HR practices renew and valorize the HC to cope with environmental dynamics and, in turn, have a positive impact on organizational outcomes. It will attempt to provide a conceptual framework that captures these elements by examining three principal HR practices, considered to be the microfoundations of HC development: employee participation in organizational restructuring; training; and competency model implementation. These practices are studied as the primary levers to renew and align the HC with the strategic objectives in order to remain competitive and address the environmental dynamics. In light of these considerations, the main research question is:

> RQ: How do HR practices favor and contribute to human capital development in changing organizations?

The main question is followed by three sub-questions that allow detailed analysis of the role of specific HR practices on HC development and their impact on the organization:

> SQ1: How can HR practices serve as microfoundations for uncovering new HC competences?
>
> SQ2: How can HR practices serve as microfoundations for addressing organizational challenges through the valorization of HC?
>
> SQ3: How can HR practices serve as microfoundations for leveraging HC development during organizational change?

This dissertation answers the RQs with a collection of specific cases (published in international peer-reviewed journals and books) in which, together with the companies and public sector organizations involved, the authors shed light on HR practices aimed at leveraging and renewing HC in a changing environment. The articles included in this dissertation are designed to bring practical and useful insights to organizations operating in a changing context.

1.3 Structure of the dissertation

This dissertation is an article-based thesis composed of two main parts: the research summary and the research articles. The research summary presents the

topic under discussion and provides a justification for and an explanation of the methodological choices made by the researcher. As shown in Figure 1, the summary includes five chapters: the introduction, in which the author presents the background of the study, the research gap, the objective and the research questions; the theoretical foundation of the study, in which the author gives an overview of the extant literature and presents the theoretical framework of the research; the methodology chapter, in which the author justifies the methodological choices regarding the research paradigm, research method, and validity of the research. The research summary also includes a concise version of each article, explaining the contribution each makes to the main research question, and a section containing discussion and conclusions.

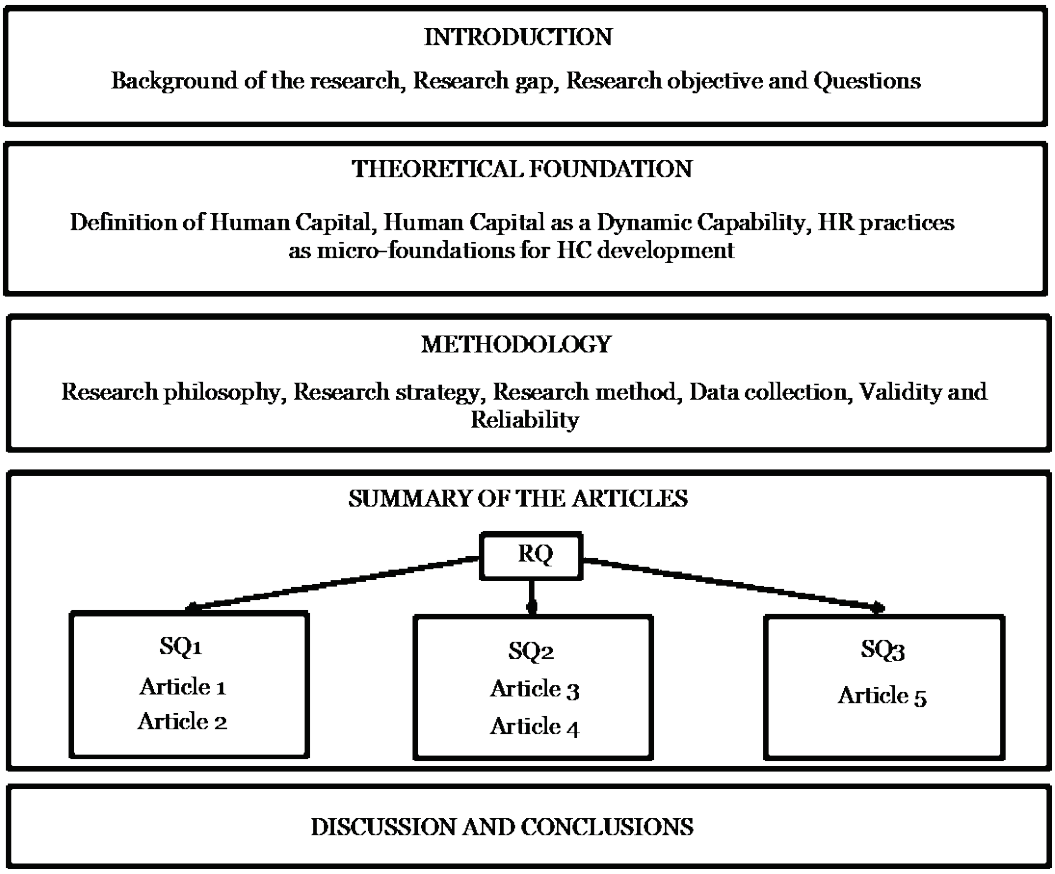

Figure 1. Structure of the dissertation

The second part of this dissertation includes the five research articles, published in peer-reviewed journals or books. Table 1 includes information about the five

articles that form the basis of this thesis and the role of the author of this dissertation in each of them.

Table 1. Overview of the articles included in the dissertation

Publication	Title	Research theme	Research design	Published in	Author's role
I	Unboxing the key human competencies for successful servitization	Competency models development and implementation	Qualitative analysis	*Practices and Tools for Servitization, Palgrave Macmillan, Springer Cham*	Design of the structure and methodology, data collection and data analysis, writing the manuscript
2	Valorizing the human capital within organizations: a competency-based approach	Valorization of HC through the definition of competencies	Qualitative analysis	*Advances in Human Factors, Business Management and Society. Advances in Intelligent Systems and Computing, Springer*	Design of the structure and methodology, data collection and data analysis, writing the manuscript
3	Training culture: a new conceptualization to capture values and meanings of training in organizations	Development of cohesive and effective strategies for training and development	Quantitative analysis	*Journal of Workplace Learning, Emerald Group Publishing*	Data collection, defining the structure of the article, writing the manuscript
4	The role of training in organizations: a comparative case study of employees and management perspectives	Analysis of the training culture across organizations to maintain, update and promote continuous learning and training	Quantitative analysis	*Organization 4.1: The Role of Values in the Organizations of the 21st Century: ISSWOV 2018*	Design of the structure and methodology, data collection and data analysis, writing the manuscript
5	The impact of a participatory ergonomics intervention: the value of involvement	Employees involvement in work-related decisions during the organizational restructuring	Longitudinal analysis	*Theoretical Issues in Ergonomics Science, Taylor & Francis*	Research design, data collection, writing introduction, method and research design

2 THEORETICAL FOUNDATION

2.1 Human Capital as a Dynamic Capability

The literature includes several attempts to define Human Capital (HC), in which the common denominator is the notion that HC represents an investment on the part of the company to ensure competitiveness, prosperity, and economic wealth (Nezam, et al., 2013) increasing its productivity and its ability to sustain competitive advantage (Schultz, 1993). HC refers to both the explicit and the tacit knowledge that people have, or to their ability to create them, to fit the mission and the goals of the organization (Cabrita & Bontis, 2008). Nevertheless, this definition of HC refers primarily to HC at the individual level, whereas the impact of HC development is visible at both individual and organizational levels (OECD, 2001). Therefore, organizations should develop individual HC which has a good fit with tasks and processes, facilitating its integration into the overall HC stock of the organization (Kaplan & Norton, 2004; Wang, Jaw, & Tsai, 2012).

Indeed, HC development is essential for the organization and consists of developing individual HC according to the firm's strategic goals (Kaplan & Norton, 2004). The product of this investment in people is the generation of a valuable and unique HC that, combined with different organizational features, contributes to the development and reinforcement of the firm's uniqueness and, in turn, to its capacity to remain competitive (Wang, Jaw, & Tsai, 2012). Nevertheless, the majority of the definitions of HC suffer from the attribution of a merely functional meaning that fails to consider it as a strategic resource for the organization in today's business environment (Philipps & Philipps, 2014; Boon et al., 2018). Indeed, according to Teece, Peteraf, & Leih (2016), in a dynamic environment, the organization must have the ability to continually reconfigure and adapt resources to develop its HC stock. From an inside perspective, HC leveraging is fundamental in managing external dynamics and requires constant development and readjustment to remain competitive over time and create value (Wang, Jaw, & Tsai, 2012).

In the literature, the ability of an organization to extend, renew, and adapt its resources to fit strategic goals in continuous evolution is defined as dynamic capability (Teece, Pisano, & Shuen, 1997). In this research, HC is approached and studied as a dynamic capability, and the researcher analyzes the ability of an organization to achieve superior performance through the fit between HC stock characteristics and strategic targets. More specifically, capabilities are collections of routines; routines represent the tacit knowledge of organizations, those

behaviors that are implemented repeatedly and automatically within the organization and that are considered appropriate and accepted in responding to specific circumstances (Winter, 2003). Therefore, dynamic capabilities are defined as the ability of an organization to adapt internal resources to face the challenge of remaining competitive in a changing environment (Teece, 2007). According to Ambrosini and Bowman (2009), such capabilities are embedded in the firm and difficult to observe and replicate.

2.2 Dynamic capability theory and Resource based view

The dynamic capability theory is rooted in the resource-based view (RBV), an "inside-out" theoretical paradigm that assumes that resources, including human, organizational, financial, and physical assets, form the strength of an organization in sustaining competitive advantage, being rare, valuable, and difficult to imitate (Barney, 1991). The RBV has been applied to several research streams focusing specifically on knowledge, management strategies, and organizational learning (Töytäri, 2015). It has, nevertheless, been criticized for concentrating primarily on the resources themselves, rather than on their optimal usage and application as means to sustain competitive advantage (Sirén, 2014). Furthermore, another criticism moved to the RBV regards the characteristics of the environment: in a dynamic environment companies cannot sustain competitive advantage through a set of static resources; a dynamic environment implies a shift of focus from resources to dynamic capabilities. Indeed, dynamic capabilities, differently from resources, facilitate the learning process and improve the ability of the organization to change faster than the competitors (Kraaijenbrink, Spender and Groen, 2010). A further element regards the definition of resources itself: what emerges from previous research is a wide and inclusive concept that lacks of specificity in making a distinction between resources as inputs to the organization and capabilities that enable the firm to select, deploy and organize such inputs (Kraaijenbrink, Spender and Groen, 2010).

In light of these critical considerations to the RBV this research applies the dynamic capabilities theory analyzing the ability of an organization of identifying opportunities and threats, seizing opportunities and maintaining competitiveness through the enhancement, combination, protection, and, when necessary, the reconfiguration of the business enterprise's intangible and tangible assets (Teece, 2007; Wang, Senaratne & Rafiq, 2015).

2.3 Microfoundations of dynamic capabilities: sensing, seizing, and reconfiguring

Dynamic capabilities, as previously mentioned, have their roots in the implied and unique resources of an organization (Teece, Pisano, & Shuen, 1997) in the form of managerial practices, training, and organizational culture (Markova, 2012; Phillips & Phillips, 2014) and vary according to their nature. It is important, therefore to stress that there is a difference between organizational and managerial processes, procedures, systems, and structures underlying these capabilities (Teece, 2007). In this regard, we need to make a distinction between dynamic capabilities and their microfoundations. In the literature, the concept of the microfoundation is used to indicate a theoretical explanation based on the results of an empirical examination of a phenomenon. Microfoundations are usually grouped into three main areas: individuals, processes, and interactions and structures (Felin, Foss, & Heimeriks, 2012). In dynamic capabilities, the microfoundations are considered to be the skills, processes, procedures, organizational structures, decision rules, and disciplines that constitute the basis of sensing, seizing, and reconfiguring capacities and that are difficult to develop and deploy (Teece, 2007; Liu, 2009; Kindström, Kowalkowski, & Sandberg, 2013).

The three groups of capabilities identified by Teece (2011) in the dynamic capability framework are indeed, sensing, seizing, and transforming. Sensing represents the ability to create or identify opportunities and, according to Teece (2007), is a learning and interpretative activity that depends on access to the information and on the capacity of the individual to recognize opportunities and interpret the available information, creating hypotheses based on the available elements. It involves learning, analysis, interpretation and creative skills. These skills, however, are not found in individuals alone; to be used to their full potential, they must be managed at an organizational level (Teece, 2007). Given the HC perspective of this dissertation, the central issue is how to manage resources to increase the ability to sense new opportunities (Teece, 2011). One of the most important steps in this process is to invest in the recruitment and/or development of individuals with the necessary competencies.

Once a new opportunity is sensed, it must be 'seized', or addressed with new and innovative solutions. Seizing represents the strategic plan and actions implemented to achieve the expected results (Teece, Peteraf, & Leih, 2016). According to Teece (2007), from an HC perspective, a company can seize opportunities internally through the training and re-training of employees, so that they develop new competencies enabling them to adapt to change, and externally acquiring new competencies from outside the organization.

Transforming means breaking conventional models and routines to implement new systems or processes. It frequently occurs as a consequence of a crisis that demands a significant change in the way of operating and management has a fundamental role in this phase, identifying and directing actions to maximize results and facilitate change (Teece, Peteraf, & Leih, 2016). To summarize, according to Wang, Jaw, and Tsai (2012), the dynamic capability of organizations is composed of three main dimensions: the strategic orientation, represented by the alignment between knowledge resources and strategic assets through the definition of strategic goals (Kaplan & Norton 2004); the learning orientation, i.e. the capability of renewing HC through learning processes (Gibson & Birkinshaw, 2004), and the dynamic orientation, consisting of the ability to reconfigure and adapt HC to strategic goals in a continuous process of change and evolution (Teece, Pisano, & Shuen, 1997; Wang, Jaw, & Tsai, 2012). In this research, these three dimensions are explored through the analysis of their microfoundations.

2.4 HR practices as microfoundations for Human Capital development

Despite the crucial role played by HR in developing HC to achieve strategic goals and sustain competitive advantage, the HR role is often considered to be merely administrative, rather than crucial in achieving business results (Philipps & Philipps, 2014). For many years, HR was seen as a functional area aimed at ensuring strategy implementation; only recently has it gained importance in the strategic decision-making of the organization (Markova, 2012), and HR practices have now started to be considered as resources in which the organization should invest to meet the challenges and opportunities arising from environmental uncertainty (Leiblein, 2003; Bhattacharya & Wright, 2005; Wang, Jaw, & Tsai, 2012). Indeed, environments characterized by high uncertainty and change do not simply demand the existence of resources (Eisenhardt and Martin, 2000; Methot et al., 2018) but imply a need to transform them into dynamic capabilities able to respond adequately to environmental challenges (Teece, Pisano, & Shuen, 1997). The three groups of capabilities identified by Teece (2011) in the dynamic capability framework—sensing, seizing, and transforming—require the implementation of different HR practices to favor the development of HC. In this research, therefore, HR practices are analyzed as microfoundations for sensing, seizing, and reconfiguring, in order to approach HC from the perspective of dynamic capability.

The literature on HR shows that HR practices—such as selection, training and development, performance management, communication and participation, and

empowerment—when tailored to organizational needs, promote the development of adaptable and flexible employee skills and behaviors, (Hitt, et al., 2001; Sirmon, Hitt, & Ireland, 2007; Ketkar & Sett, 2009) and have a positive impact on employees' productivity and creativity (Markova, 2012). Moreover, investment in HR practices aimed to develop intangible assets, such as employee competencies, attitudes and values, brings positive outcomes for the organization in terms of inimitability and competitive advantage that are harder to imitate than, for example, technology and market positioning (Selvarajan, et al., 2007). Therefore, a company that wants to remain competitive and innovative over time should invest more in an HR philosophy oriented towards employee involvement and empowerment (Guthrie, Spell, & Nyamori, 2002).

Nevertheless, the sole existence of these human-oriented practices does not guarantee a firm's competitiveness in an uncertain business environment. Indeed, practices aimed at enhancing HC require time to be implemented and absorbed into organizational routines and values, aligned with the firm's strategic goals and communicated to and imbued in the members of the organization (Markova, 2012) in order that they may become dynamic capabilities. The literature contains evidence of how the implementation of HR practices can promote the development of appropriate skills and behaviors of employees. These practices are grouped into several areas: selection and staffing of employees; training and development; performance management; compensation, rewards, and incentives; communication; participation; and empowerment (Ketkar & Sett, 2009).

This dissertation (as shown in Figure 2) considers three main HR practices as microfoundations of sensing, seizing, and transforming to help organizations enhance their HC development as a key resource and foster organizational uniqueness: the definition and development of competencies as a strategic tool to align individual competencies to organizational targets; the role of training and of the training culture in developing HC competencies so the organization can remain competitive over time; and the participation and inclusion of employees in the organizational restructuring process as a key practice in realigning HR to the new business needs.

The organizational context of this research is characterized by change and transformation. Indeed, at the time of conducting the research, all the organizations participating in this study were facing either an internal restructuring process or a transition in the scope and orientation of the business due to changes in the business environment.

The next paragraphs present the theoretical grounds of each HR practice and the processes through which organizations develop HC through sensing, seizing, and reconfiguring internal resources.

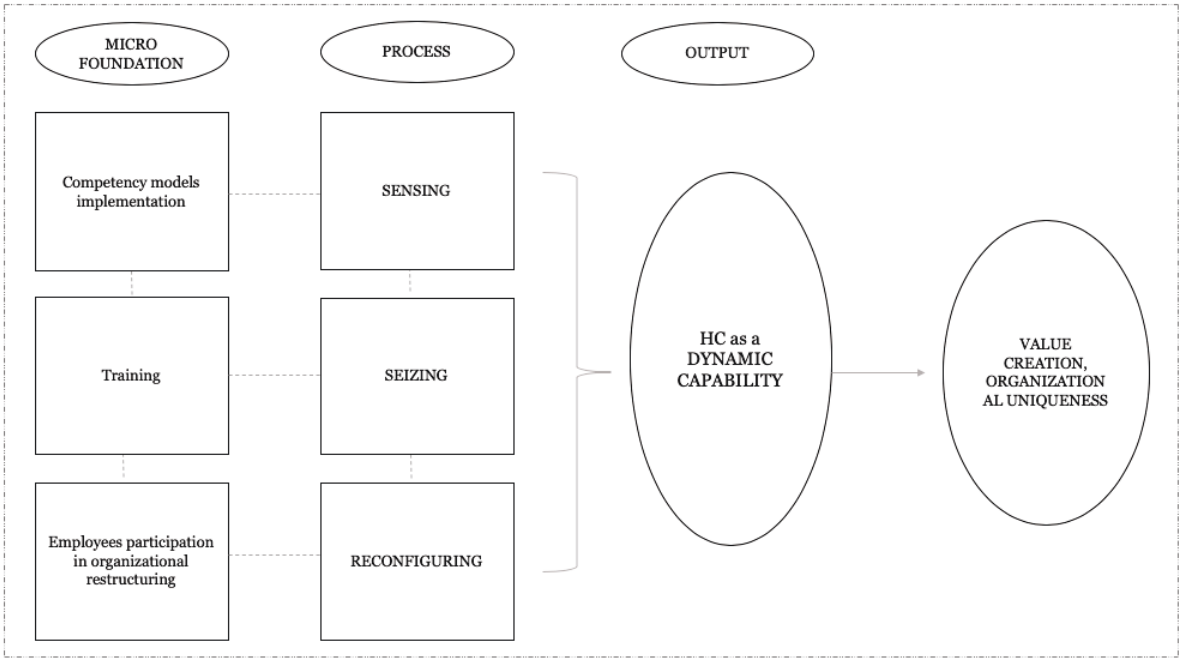

Figure 2. Theoretical framework of the dissertation

2.5 The definition and development of competencies to sense new opportunities

Organizations operating in a changing business environment need to identify options for growth and implement new business strategies quickly and effectively (Hitt, Keats, & DeMarie, 1998) in order to generate uniqueness and remain competitive over time (Teece, Peteraf, & Leih, 2016). To achieve this objective, they need to develop the ability to sense opportunities and create and plan new options and scenarios, bringing together different perspectives (Teece, Peteraf, & Leih, 2016).

The sensing ability is a learning and interpreting ability that depends on individuals' capacity to learn, analyze, interpret and implement solutions creatively; however, this ability does not belong exclusively to individuals but needs to be managed at an organizational level (Teece, 2007). Therefore,

organizations, to identify and use their resources in a unique manner, need to develop robust sensing and creative capabilities, focusing specifically on employees' competencies as crucial leverage in developing organizational uniqueness (Vakola, Eric Soderquist, & Prastacos, 2007; Teece, 2011). To facilitate this process, organizations should align knowledge, resources, and strategic assets (Kaplan & Norton, 2004). In practice, this means defining business objectives and strategic targets and identifying the competencies needed to achieve those targets, thus allowing the right skills to be developed and business objectives to be met easily and rapidly (Athey & Orth, 1999; Vakola, Eric Soderquist, & Prastacos, 2007).

Moreover, increased competition and the introduction of new technologies have influenced the business environment and the nature of work, shifting to a more dynamic way of working (Dai & Liang, 2012). Indeed, with rapidly changing business needs, organizations need employees who are not only highly skilled but also adaptable, and ready to learn fast and develop professionally (Rodriguez, et al., 2002; Campion, et al., 2011). Nevertheless, translating the business strategy into individual competencies remains one of the most challenging managerial tasks (Kaplan & Norton, 2005) and, in the majority of cases, a prescriptive approach is adopted (Sparrow, 1997).

To overcome this trap, competency should be defined, aligning individual capabilities to the organization's core competencies (Le Deist & Winterton, 2005). The challenge is to define a multi-layered approach, starting from the organization's core competencies, that allows the deployment of the right mix of knowledge, skills and abilities (KSA) needed by individuals to produce and support the organization's core competencies (Vakola, Eric Soderquist, & Prastacos, 2007). In light of these considerations, the implementation of competency models, as HR practices that enable HR to be connected to the organizational strategy, facilitates the identification of the KSAs needed to perform effectively in an organization and to adapt to changes in the business environment (Campion, et al., 2011). Indeed, as previously mentioned, in order to be effective, the main prerequisite of competency models is the link to business strategy and objectives; therefore, competency models refer not only to the KSAs needed in a specific job but also to a specific organizational context and business sector (Shippmann, et al., 2000). The implementation of competency models allows an organization to include employees' KSAs in their management (Campion, et al., 2011), including also elements to understand how KSAs change and progress according to employee level (Rodriguez, et al., 2002).

Competency models differ from job analysis in their scope: while the aim of job analysis is to better understand and measure a job assignment, the aim of competency models is to influence the way job assignment are performed and to make sure that they are in line with the organizational strategy (Sanchez and Levine, 2009). Further the focus of competency models is on the organization rather than on the job. They consider a future orientation; indeed, as they are defined on the basis of business objectives, competency models include a medium-term horizon (Campion, et al., 2011). Furthermore, competency models are important tools in implementing HR practices effectively and fairly and, for the same reason, are useful to the organization in the hiring, training, evaluating, and promoting of employees (Campion, et al., 2011). In the context of an organizational development intervention, they are useful in facilitating the success of organizational change.

2.6 Training to seize and address new opportunities

After sensing new opportunities, organizations should find a way to address them (Chatterji & Patro, 2014); this phase is defined by Teece (2007) as seizing. From an HC perspective, a good internal strategy for seizing opportunities is offering further training to employees, in order to update and develop their competencies in line with the new needs of the organization. In today's work environment, characterized by continual change and market uncertainty, training has become one of the most value-enhancing HR practices (Berk & Kase, 2010), constituting a means for organizations to improve organizational performance and employee knowledge and skills, adapting to the changing environment (Buckley & Caple, 2007; Ballesteros-Rodríguez, De Saá-Pérez, & Domínguez-Falcón, 2012).

A further dimension of the dynamic capability of organizations is the learning orientation, that is, the capability of renewing HC through learning processes (Gibson & Birkinshow, 2004). In this regard, training represents a strategic tool by which to increase individual and organizational learning (Martocchio & Baldwin, 1997) and the satisfaction and involvement of employees with the organization (Browning, Gray & Garrett, 2009) , as well as being fundamental in preventing the obsolescence of HC knowledge, thus sustaining competitive advantage (Wright, Dunford, & Snell, 2001). Training, therefore, represents a crucial element of HC investment, planned by the organization to promote the acquisition of knowledge, skills, abilities, and behaviors related to the organizational goals (Wexley & Latham, 1991) and supporting strong performance in current and future jobs (Tabassi, Ramli, & Bakar, 2011). According to Dolan et al. (1999), it impacts on several dimensions: individual performance, the

acquisition of skills, organizational problems, and the orientation of new employees. Thus, training has an interconnected impact on both the individual and organizational levels: for employees, it facilitates the acquisition of new KSAs (Schmidt, 2007) and, for the organization, it influences the ability to absorb new knowledge (Berk & Kaše, 2010).

Nevertheless, it is only recently that research on training has considered the contextual factors, defining training as a system embedded in the organizational context (Salas & Cannon-Bowers, 2001; Polo, Cervai, & Kantola, 2018), developed to fit organizational needs and based on organizational values, beliefs and practices (Huerta, Audet, & Peregort, 2006). Training, indeed, is an HR practice closely connected to the organizational culture and to the other HR practices implemented in the organization (Kusluvan, et al., 2010); otherwise, it might not be able to fulfill its role (Aguinis & Kraiger, 2009).

Consistent with the RBV, training has an important role in developing and maintaining individual and organizational competencies (Valle, Martin, Romero, & Dolan, 2000); therefore, companies should invest more in specific training to develop employees' absorptive capacity and their ability to react to unforeseen circumstances (Berk & Kase, 2010) that, in turn, impact on the organizational HC, making it adaptable, unique and difficult to imitate (Barney, 1991). Although the goal of training is improving the overall organizational performance through the acquisition of new competencies at an individual level, many studies reveal that training frequently does not deliver the expected results (e.g. Cromwell & Kolb, 2004; Burke & Hutchins, 2007; Velada & Caetano, 2007; Ballesteros-Rodríguez, De Saá-Pérez, & Domínguez-Falcón, 2012). This may be due to various factors but, above all, to the failure to transfer the training to the workplace and to colleagues (Velada & Caetano, 2007). Defined and structured systems are needed to monitor the results of training and the achievement of the initial objectives.

Furthermore, research in the field of HR has focused principally on the effects of training rather than on the factors underpinning the decision to train employees (Hansson, 2007). Previous research highlights that managers play a crucial role in facilitating employees' learning and training (Hasson, McKenna, & Keeney, 2013); nevertheless, in the current business environment characterized by change, subordinate engagement in development activities has become essential to acquire, adapt and differentiate competencies to the new needs (Bezuijen, van Dam, van den Berg, & Thierry, 2010). The perspective presented in this paragraph considers training as a process that has as its final aim the improvement of performance (Tabassi Ramli, & Bakar, 2011). Organizations need to identify effective training methodologies that, together with other HR practices, favor the

process of change and the development of new competencies to sustain competitive advantage (Rothwell, Hohne, & King, 2012).

2.7 Employee involvement in transforming and restructuring the organization

The transformation of an organization to keep up with changes in the business environment is a process that requires conventional models of thinking and doing to be broken, and is often related to a crisis or to a change (Teece, Peteraf & Leih, 2016) It requires structures and systems in the organization to be adapted and demands a focus on the process that will lead people to accept and adapt to the change, bringing their added value to the organization. In this regard, one of the dimensions of the dynamic capability of an organization is its dynamic orientation: the ability to reconfigure and adapt the HC to strategic goals in a context of continual change and evolution (Teece, Pisano, & Shuen, 1997). In this respect, the literature on organizational change highlights that the inclusion of appropriate HR practices in organizational restructuring processes improves organizational efficiency and promotes the reintegration of HC stock, reducing negative effects (Wang, Jaw, & Tsai, 2012). At the same time, the development and alignment of HR practices with organizational goals and strategy allows a context to be created, based on shared orientation and values, that shapes individual and collective behaviors, facilitating the achievement of fit and flexibility (Chan, Shaffer, & Snape, 2004). To reach this ambitious goal, companies should invest in communication systems and participatory approaches to motivate employees to engage in the organizational process and, in turn, create competitive advantage and inimitability for the organization (Wang, Jaw, & Tsai, 2012).

This practice of transformation based on employee involvement is defined in the literature as HC-oriented restructuring and follows a participative approach, in which the employee has a central role in the process of planning and change (Cascio & Wynn, 2004). To ensure that appropriate strategies are identified, and to manage the change, the company should invest in a preliminary phase aimed at evaluating the situation within the organization before the intervention. Organizational culture, structures, business processes, and employees' core competencies should be examined and evaluated to better tailor the restructuring process (Trevor & Nyberg, 2008).

The restructuring process includes the implementation of successful strategies for organizational change; implementing a long-term mindset; and investing in employee participation, caring, and sense of justice (Wang, Jaw, & Tsai, 2012).

Indeed, the participation of employees in creating a common goal increases the sense of involvement, commitment, shared identity and mutual trust (Wang, Jaw, and Tsai, 2012). In turn, this allows the organization to create a sense of belonging, trust and commitment, retaining firm-specific knowledge, experiences, and skills (Trevor & Nyberg, 2008). The implementation of a participative approach in restructuring allows the firm to align, integrate, and renew HC resources to maintain its competitiveness by adapting internal characteristics to the dynamic business environment (Lopez-Cabrales, Valle, & Herrero, 2006; Wang, Jaw & Tsai, 2012). In order to ensure the success of the organizational restructuring, organizations should implement a long-term strategy to leverage and develop the firm's HC in order to face environmental change with dynamic capabilities (Cascio & Wynn, 2004). In other words, firms should invest in people to generate unique value for the organization, ensuring inimitability and, thus, competitive advantage (Lengnick-Hall & Lengnick-Hall, 2003).

3 RESEARCH METHODOLOGY

This chapter presents the empirical approach adopted in this dissertation and provides justifications for the philosophical assumptions, research design and strategy, methodological choices, data collection, data analysis, and validity and reliability issues.

This dissertation represents an effort to develop *ad hoc* methodologies that organizations can implement to sense, seize and reconfigure internal resources in order to develop HC and remain competitive in a changing business environment. The methods and tools implemented in this research were developed by the author in the light of the extant literature in the field and were tested with a panel of experts to verify their appropriateness. Data were elaborated following the principles of scientific research.

The Onion diagram (Saunders, Lewis, & Thornhill, 2007) shown in Figure 3, summarizes the methodological choices made in this research; the following paragraphs contextualize and explain the motivations for these choices.

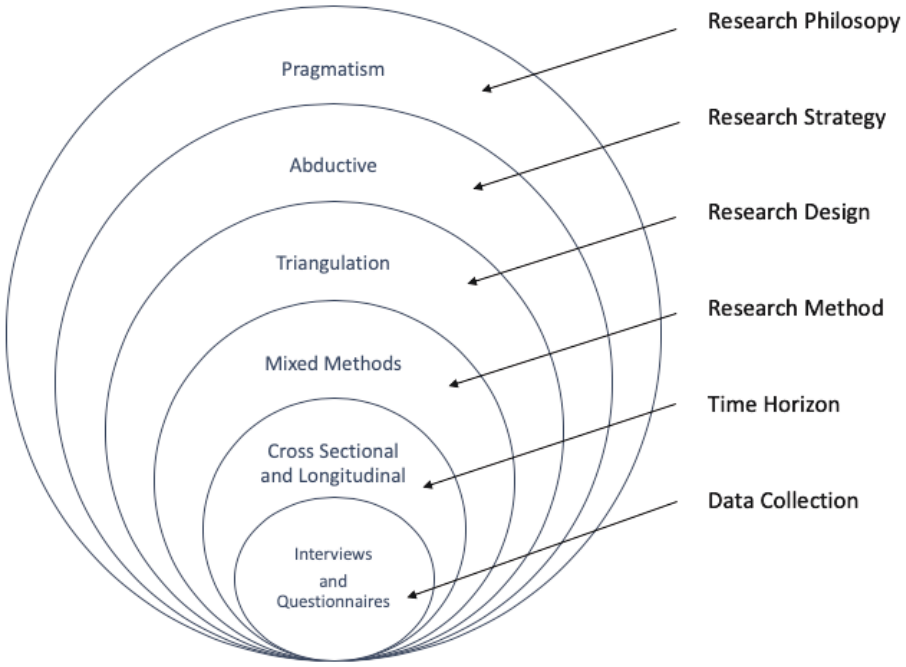

Figure 3. Onion diagram: summary of methodological choices (adapted from Saunders, Lewis and Thornhill, 2007)

3.1 Research philosophy

A paradigm is a system of beliefs or a worldview that influences the choices of the researcher, not only regarding the methodology adopted, but also at a deeper level related to the ontological and epistemological assumptions (Guba & Lincoln, 1994). Researchers through the years have attempted to classify the main paradigms. Guba and Lincoln (1994) identified four main paradigms: positivism, post-positivism, critical theory and constructivism. Tashakkori and Teddlie (1998) classified the paradigms as positivism, post-positivism, pragmatism and constructivism. Rossman and Rallis (2003) defined four paradigms: positivism, critical interpretivism, humanism and critical realism. Creswell (2014) classified them as post-positivism, transformative, constructivism and pragmatism. The paradigms differ in terms of the researcher's basics assumptions about the nature of reality (ontology), the way reality is studied and knowledge is acquired and developed (epistemology), and how the research is implemented, including selecting cases, collecting and analyzing data, observing effects, reporting results, etc., (methodology) (Creswell, 2017).

Table 2 presents, in a very summarized version, the most common paradigms and the underlying ontology, epistemology and methodology of each. After consideration of the strengths and weaknesses of each paradigm, this thesis adopts pragmatism as the most practical research philosophy available, avoiding metaphysical concepts, such as "reality" and "truth", that do not apply to the research questions and the research aim of this dissertation (Tashakkori & Teddlie, 2003). Indeed, the pragmatic approach considers the research questions as the most important element in defining and guiding the research procedures (Creswell & Plano Clark, 2011). Regarding the ontology, the pragmatic paradigm contemplates the existence of singular and multiple realities; indeed, the researcher tests different hypotheses and provides multiple perspectives. Concerning the epistemology, the researcher implements a practical approach, collecting data according to what best addresses the research questions.

From the methodological standpoint, pragmatism supports the use of both quantitative and qualitative methods in the same study at different levels (Creswell & Plano Clark, 2011). Indeed, in social sciences, pragmatism is often linked to the use of mixed methods (Biesta, 2010). Nevertheless, the adoption of research paradigms is the subject of much debate in mixed-methods research (Tashakkori & Teddlie, 2003). Some scholars suggest an a-paradigmatic approach to mixed-methods research, while others contemplate the possibility of using a single paradigm, or more than one paradigm, according to the methodology implemented in the single study (Evans, Coon, & Ume, 2011). This dissertation is

among those that affirm that a single paradigm can serve as the foundation for mixed-methods research and it implements the pragmatic worldview.

Pragmatism allows the researcher to study interesting and valuable topics in the most appropriate way, bringing positive consequences for the researcher's value system (Tashakkori & Teddlie, 2003). Further, it enables problems to be addressed in a practical way in order to highlight implications and critically examine possible solutions. This approach is particularly suited to management research, especially for research based on case studies, where the focus of the researcher is on finding the most suitable solution to the problem. The flexibility offered by pragmatism to better understand the context is essential to the research environment of this research, which is characterized by change and unpredictability. The research problem and research questions are concrete, and the focus is on solving the problem, integrating objective and subjective perspectives.

Table 2. Comparison of the most used research paradigms

Research paradigm	Positivism	Post-positivism	Critical realism	Constructivism/ Interpretive	Pragmatism
Ontology	There is a single reality or truth	The interpretation of reality is affected by knowledge and values	Reality is socially constructed and requires the understanding of human agency causing events as well as the social structures in which the actors operate	There is no single reality or truth. Reality is socially constructed.	Reality is constantly debated, renegotiated, interpreted in light of its usefulness in unpredictable situations
Epistemology	Reality can be measured with no interference from the researcher	Reality can be measured but the researcher's knowledge and values impact on the process.	Knowledge and theories are examined in the light of history, social belief and situational factors	Reality needs to be interpreted	The focus is on solving the problem, integrating the objective and subjective points of view
Methodology	Quantitative	Quantitative	Qualitative	Qualitative	Mixed methods

3.2 Research strategy

One of the major tasks facing a researcher during the research process is to identify the most appropriate procedure to generate new knowledge. This involves not only the selection of the methodology for the collection and analysis of the data but the identification of the most suitable way to answer the research questions (Blaikie, 2007). This subchapter summarizes the main research strategies and clarifies the logic behind the one adopted in this dissertation.

Blaikie (2007) identifies four main research strategies: inductive, deductive, retroductive, and abductive. The inductive strategy aims to produce universal generalizations from the data collected; these will be used as patterns to explain further observations. The deductive strategy applies the opposite logic; indeed, it starts with an already established theory that needs to be tested by deducing hypotheses able to explain the phenomenon. The retroductive research strategy starts in the same way as the deductive strategy with an observed regularity but seeks to provide an explanation in a different way: by discovering and testing the mechanisms behind the regularities through observations and experiments. These mechanisms are either social structures or cognitive mechanisms. The abductive strategy, unlike the others, considers as a starting point the social world of the investigated actors with the aim of describing and giving meaning to their social world by observing it and developing and testing theories from it iteratively.

Unlike the other approaches, the abductive one uses all available data to identify coherent patterns to explain a phenomenon (Teece, Peteraf, & Leih, 2016). According to Teece et al., (2016) citing Peirce (1932) an American philosopher, both inductive (from specific examples to general principles) and deductive reasoning (from general precepts to specific truths) depend on the past and, therefore, do not generate anything new, while abductive reasoning allows the researcher to move ahead through "logical leaps of the mind". In this dissertation, articles with a qualitative research design (see Table 3), aimed at exploring the phenomenon to gain a deeper understanding and produce a new theory (Kothari, 2004), implement an inductive research strategy to produce generalizations from the data collected. Conversely, articles adopting a quantitative research design (see Table 3), with the aim of testing theories and constructs or identifying the relationships between constructs (Denzin & Lincoln, 2005), implement a deductive research strategy, deducing hypotheses from the theory and testing them to explain the phenomena.

This dissertation—despite including articles adopting different research strategies and methods—implements abductive reasoning overall, in order to combine the

findings of each article to identify the most suitable explanation for the initial observations and provide an answer to the research questions. In abductive reasoning, the inference is reached by identifying the best possible set of explanations that meet the conditions of the research, but which would, individually, be insufficient to explain the phenomena (Timilsina, 2017). In this research, abductive reasoning enables the actions, motives and situations to be re-described using scientific language. Finally, abductive reasoning is based on the active participation of the researcher, and this is a characteristic element of this research work. Indeed, as already suggested by Töytäri (2015), in this dissertation, the researcher is responsible for interpreting empirical observations by choosing the best explanation according to their criteria.

Table 3. Research method and strategy

	Research method	**Research strategy**
Article 1	Qualitative	Inductive
Article 2	Qualitative	Inductive
Article 3	Quantitative	Deductive
Article 4	Quantitative	Deductive
Article 5	Quantitative/Qualitative	Deductive
Whole dissertation	Mixed methods	Abductive

3.3 Research design

This thesis, as mentioned before, combines evidence from both quantitative and qualitative analysis. According to Clark, et al. (2008), various research designs allow the combination of the results of quantitative and qualitative studies, including triangulation design, embedded design, explanatory design and exploratory design. These design types vary according to the way the quantitative and qualitative data are related. This dissertation adopts a triangulation design, conducting quantitative and qualitative studies in parallel and independently from one another. Subsequently, the results of each study are compared and in order to reach a single interpretation (see Figure 4). Triangulation allows the researcher to gain a deeper understanding of the topic by using different, but complementary, types of data (Morse, 1991) and providing an exhaustive synthesis of the information each offers.

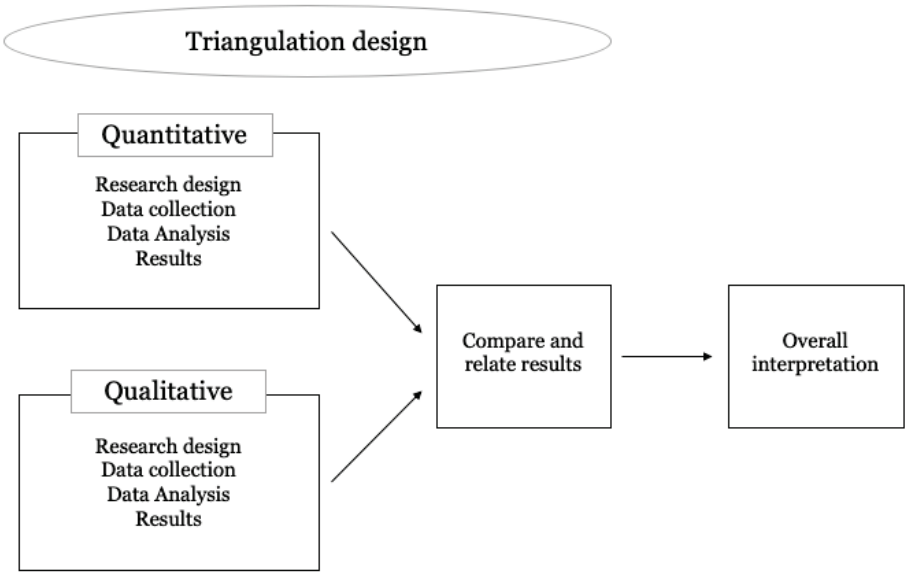

Figure 4. Triangulation design from Creswell and Plano Clark, (2007)

In this dissertation, quantitative and qualitative data have been triangulated to answer the main RQ: *How do HR practices favor and contribute to human capital development in changing organizations?* and they contributed equally in addressing the RQ. As shown in Figure 5, the thesis includes five articles, answering three sub-questions.

SQ1, *How can HR practices serve as microfoundations for uncovering new HC competences?* is addressed through two qualitative studies that enable the definition and implementation of competency models tailored on the business sector and on the characteristics of the organization to help in enhancing and valorizing HC through the definition of competencies based on the business objectives.

SQ2, *How can HR practices serve as microfoundations for addressing organizational challenges through the valorization of HC?* is analyzed through two articles that implement quantitative research methods, highlighting that training and the development of a training culture are strategic tools that promote the updating of employee competencies, enabling the organization to enhance its HC and, thus, achieve its strategic objectives.

SQ3, *How can HR practices serve as microfoundations to leverage HC development during organizational change?* is explored through a quantitative

and qualitative research design that highlights that employees' participation and inclusion in organizational restructuring play a crucial role in aligning HR to the new business needs and, in turn, have a positive impact on both productivity and employee job satisfaction. The three sub-questions together provide evidence to contribute to the main RQ.

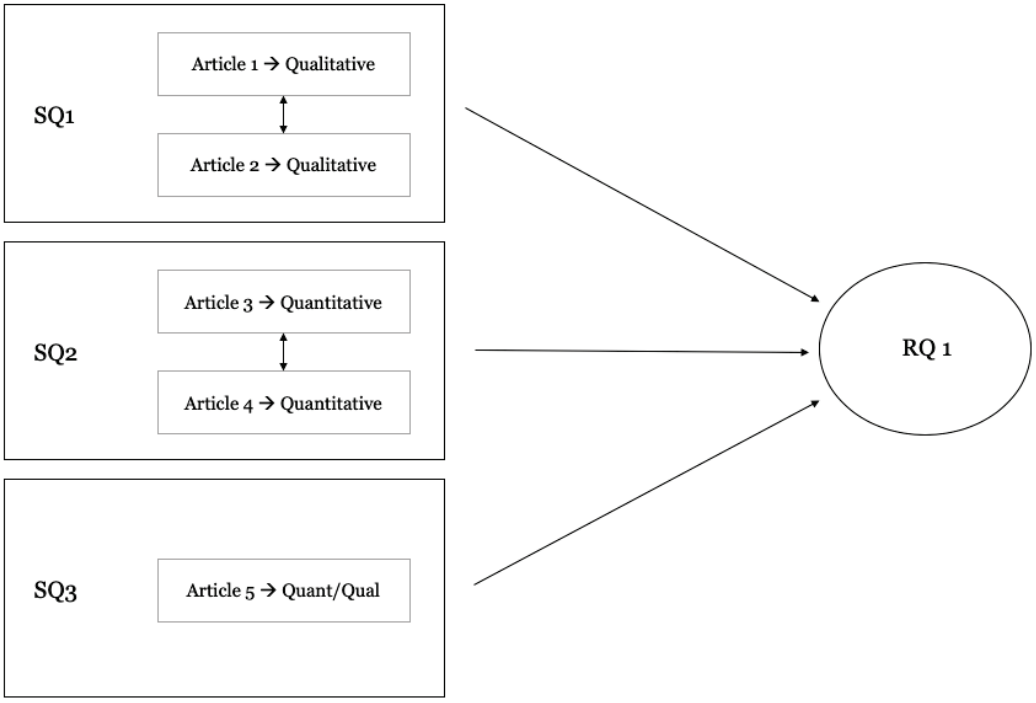

Figure 5. Research Design of the dissertation

3.4 Research method

This research combines the use of both quantitative and qualitative methods for data collection and analysis to give a complete and broad understanding of the research problem. This research approach is defined in the literature as a mixed-methods and involves considering multiple perspectives in approaching theoretical and practical knowledge (Johansson, 2007) and in collecting and analyzing the data and integrating the findings (Tashakkori & Creswell, 2007).

As Creswell & Plano Clark (2011) suggest, the mixed-methods researcher must ensure they:

- collect and analyze with rigor both qualitative and quantitative data on the

basis of the research questions;
- choose one or both forms of data according to what the research aims to emphasize;
- frame these procedures within a philosophical paradigm;
- combine these procedures in a research design that constitutes a guide for conducting the research.

Although mixed methods are applicable in a huge variety of disciplines, they are particularly suited to research problems where a data source is insufficient to explain results, or exploratory findings need to be generalized through a different methodology, and also to cases where the general research objective can be explored in multiple phases or through different projects or methods (Creswell & Plano Clark, 2011). Furthermore, according to Meredith et al. (1989), the implementation of different methods, if appropriate and effective in the specific situations, ensures the robustness of the results and makes a relevant contribution to research and practice. However, mixed methods should be applied only if supported by the nature of the research questions and when considered appropriate in the experience of the researcher and suitable to reach the audience of the research (Creswell, 2017).

In this dissertation, mixed methods were considered the best choice for the researcher to make a solid and relevant contribution to the general objective and to provide answers to the main research questions, integrating and corroborating the findings of the quantitative and qualitative studies. Furthermore, given the nature of the research problem and the research objective, mixed methods were considered the most suitable methodology to reach the audience of the research. However, it is important to specify that a mixed-methods approach is not applied in each individual study included in the dissertation, but to the dissertation as a whole. As shown in Table 3, Articles 1 and 2 implement qualitative methods with data collected through open interviews. Article 5 is based on quantitative and qualitative methods. Articles 3 and 4 are based on quantitative data.

3.4.1 Case study and survey

This thesis combines two principal methodologies: the case study and the survey. Specifically, Article 1, Article 2, and Article 5 are based on a single case study, while Articles 3 and 4 are based on a survey. We will now briefly examine the characteristics of both designs and explain how and why they have been implemented in this research.

According to Yin (2012), a case study is an empirical examination of a contemporary phenomenon (the so-called case) studied within its real context. The condition *sine qua non* to implement the case study methodology is to have a case as the object of examination; the case should also conform to specific characteristics in being: (i) a complex functioning unit, (ii) investigated in its natural context through the implementation of different methodologies, and (iii) be contemporary (Johansson, 2007). The case-study methodology allows the researcher to answer the *how* and *why* research questions through real-world cases (Yin, 2009), implementing a range of techniques, including document analysis, direct observation, participant observation interviews, and surveys (Tellis, 1997).

This thesis seeks to answer the *how* research questions through single case studies. Specifically, Articles 1 and 2 are based on document analysis and open interviews, while Article 5 adopts document analysis, direct observation and a survey. The results of the case studies conducted within these articles rely on relevant evidence corroborated by the researcher in addressing the research questions. Furthermore, this thesis takes the form of a multi-perspectival analysis, considering not only the perspective of the actors but also the interconnection between them and the interaction with the real context.

The second methodology adopted in this thesis is the survey; indeed, Articles 3 and 4 are based on quantitative methods and Article 5 also uses the survey as one of the tools chosen for data collection. The survey is a systematic method of data collection that enables information to be gathered from a sample (a subset of the population) in order to construct quantitative descriptors of the target population. In other words, the survey provides information about elements of a population that cannot be observed directly, such as attitudes, opinions, or belief regarding a specific topic of analysis (Groves, et al., 2011). In this thesis, two topics are investigated by survey: management and employees' views of the role of training within an organization, and the consequences of employee participation in organizational restructuring.

3.4.2 Data collection

In this study, data collection and analysis have been conducted following the principles of the scientific research: honesty—the methods and results are truthful and accurate, without fabrication, falsification, or plagiarism of data; objectivity — the interpretation of results and decisions are based on facts, without the influence of external sources; integrity and openness—methods, data, results and their interpretations have been published, and thus submitted to criticism; and

responsibility—this research does not duplicate research carried out by other researchers (Kruk, 2013).

Articles 1 and 2 are based on a qualitative data set. Data were collected in 2017 through semi-structured interviews, composed of four open questions and a number of sub-questions to stimulate the discussion between interviewer and interviewees. The duration of each interview was, on average, 30 minutes, and 34 key figures in senior managerial positions were interviewed. After the data elaboration, the evidence was discussed and validated with a pool of experts within the organization to verify its robustness.

Article 3 consists of a scale validation process and, therefore, uses a quantitative approach to examine the psychometric properties of the Training Culture Scale (TCS). The scale was pre-tested in a group of 25 people and discussed with a panel of experts to test the understandability and appropriateness of the items. Data were collected in six organizations in 2015 using a sample of 360 people. Response choice was recorded using a visual scale from 0 to 100 on 23 items.

Article 4 is a quantitative study on the implementation of the TCS. Data were collected in 2017 in one multinational company. The scale consists of 23 items with answers on a visual scale from 0 to 100. The sample comprises 417 people: 249 employees and 165 people with managerial responsibilities.

Article 5 is the only longitudinal study included in this dissertation and it was conducted in two phases: 76 people were interviewed in 2009 and 50 in 2013. Data were collected through a survey with answers on a 5-point Likert scale followed by some open questions. This method allowed the author to collect quantitative data on the five dimensions explored (fatigue, repetitiveness, occupational safety/ company attention to safety, usefulness and job satisfaction) integrated with qualitative information on each dimension. This quantitative/qualitative methodology allowed robust data to be gathered and ensured that the interviewees had an accurate understanding of the questions.

3.5 Quality of the research (validity and reliability)

The quality of the research in terms of both results and processes is ensured through the measurement of two key aspects: reliability and validity. This section guides the reader in understanding what each means in terms of quantitative and qualitative research and describes the main issues related to reliability and validity in mixed-method research and how they were addressed in this research.

The literature agrees in defining reliability as a prerequisite for validity (Nunnally & Bernstein, 1967). Reliability refers to the repeatability of the measures and of the results under similar conditions (Selltiz, Wrightsman, & Cook, 1976). However, ensuring that the findings can be replicated is not sufficient to determine validity because it gives no information about the appropriateness of the measures implemented to obtain those results. Therefore, researchers also have to test for validity.

Validity represents "the extent to which a concept, a scale or set of measures accurately represents the concept of interest" (Hair, et al., 2010) or, put differently, the extent to which the research answers, or measures in an appropriate manner, what it was aimed to measure. The concept of validity in mixed-methods research has been much discussed (Tashakkori & Teddlie, 2003). Validity has been rejected by some mixed-methods scholars (Creswell & Plano Clark, 2011) while, for others, validity is not an overall aspect of the research but can be related to different steps of the research process (Onwuegbuzie & Johnson, 2006). Tashakkori and Teddlie (2009) consider validity in mixed methods to be related to the design and interpretation phase of the research, while Onwuegbuzie and Johnson (2006) consider validity to be a determinant in the data analysis phase. Validity issues can emerge in every phase of the research process; in this research, the author therefore follows the suggestion of Creswell and Plano Clark (2011) of implementing strategies to minimize threats to validity in each step of the research process.

There are several forms of validity in the literature and they vary in their implementation according to their use in qualitative or quantitative research. In quantitative research, the validity of a study can be tested by assessing construct validity, internal validity and external validity (Heale & Twycross, 2015; Leviton, 2015; Reichardt, 2015). Construct validity concerns the operationalization of measures in order to understand the theoretical concept under examination (Bagozzi, Yi, & Phillips, 1991; Nunnally, 1978) and is measured through convergent and discriminant validity (Huck, 2007). Convergent validity measures whether constructs that are expected to be related are in fact related (Straub, 2006), while discriminant validity tests whether constructs that are intended to be not associated are, in fact, not associated (Messick, 1995). External validity measures the generalizability of the findings of the study and is assessed by evaluating to what extent the sample population represents the entire population, and whether the sampling method is acceptable (Dellinger & Leech, 2007; Modell, 2005), whereas internal validity measures the extent to which the findings support a claim about a cause-and-effect relationship (Reichardt, 2015).

Reliability, also known as internal consistency in quantitative research, refers to the stability of the measures. Internal consistency in social sciences is typically estimated through the calculation of the Cronbach's alpha (Cortina, 1993; Peterson & Kim, 2013) which measures the degree of correlation between different items, determining whether multiple items measure the same theoretical construct (Cortina, 1993).

In qualitative research, validity issues are assessed through credibility and transferability (Guba & Lincon, 1994). Credibility in qualitative research is equivalent to internal validity in quantitative research and concerns the extent to which the research findings reflect reality (Denzin, 1970; Shenton, 2004). Transferability in qualitative research equates to external validity in quantitative research and assesses the degree to which the findings from one context can be applied to different groups and contexts (Brink, 1993).

Reliability, in qualitative research, refers to the consistency of results (Leung, 2015) and the trustworthiness of the process; a margin of variability is tolerated because the implementation of the same methodology and epistemology can yield results that are ontologically similar but differ in richness and ambience (Leung, 2015). Reliability issues are addressed by considering dependability and confirmability (Guba & Lincon, 1985). Dependability is ensured through a detailed account of the process (Cohen, 2011), while conformability implies objectivity and accuracy, showing that the research results are reported on the basis of the respondents' experience, free from the researcher's bias (Pandey & Patnaik, 2014).

In this dissertation, following suggestions from the literature on mixed methods, validity and reliability were ensured in all phases of the research process, from the research design to the discussion of results. In Articles 1, 2 and 5, a detailed account was kept of the methodology and the tools used for data collection, and these were subject to review from external experts in the field in order to ensure the trustworthiness of the process and the suitability of the tools to measure the proposed constructs. The instruments were designed according to suggestions from the extant literature and following the methodological prerequisites for scientific research. Qualitative data were collected, elaborated and analyzed with objectivity and accuracy, and results were reported avoiding researcher bias, based solely on the respondents' experience, reflecting reality.

In Article 3, in order to ensure the validity and reliability of the process and of the results, the guidelines for a deductive scale development process have been followed (Slavec & Drnovšek, 2012). The scale was developed according to the extant literature in the field, and the pre-test was conducted on a sample of 25 people and discussed with experts, to ensure that the items are understandable

and appropriate. Further, content validity was performed to verify the relevance of the items and their representativeness for the measured construct. Reliability was measured through the internal consistency, calculating the Cronbach's alpha at overall level and in each of the three dimensions of the questionnaire. To assess the construct validity, the mean inter-item correlation (MIC) and its average variance extracted (AVE) were calculated.

Article 4 discusses the implementation of the scale validated in Article 3 to explore its possible applicability in the corporate sector and compares managerial and employee perceptions. The scale was tested on a sample of 417 units (249 employees and 165 subjects with managerial responsibility) through a principal component analysis followed by confirmatory factor analysis. Validity and reliability were ensured as in Article 3. The preliminary data analysis conducted in this article consisted of the implementation of t-statistics in R. Further, regression models were performed to verify how employee and management perceptions of training might vary and to identify the main factors influencing these perceptions of training at different levels.

4 SUMMARY OF THE ARTICLES

This dissertation consists of five articles aiming to analyze three HR practices: competency modelling, training, and employee participation in work-related decisions during organizational restructuring as microfoundations of HC development, and their role in aligning HC and business objectives to remain competitive and manage environmental dynamics. This chapter briefly summarizes the aim, methodology and findings of each article. The full version of the articles is included in the second part of the dissertation. The five articles have been organized into the three main areas in which the researcher analyzes three different HR practices: the implementation of competency models as a strategic tool to align individual competencies to organizational targets; the role of training in the development of HC and employee participation and inclusion in organizational restructuring.

The first area aims to answer SQ1 *How can HR practices serve as microfoundations for uncovering new HC competences?* investigating how the implementation of competency models can serve as microfoundations for translating the vision and strategy of the organization into competencies that allow the development of HC. Specifically, it explores how changes in the business environment require the alignment of employees' competencies in order to valorize HC and sustain competitive advantage, and it includes two articles.

The first publication is a book chapter entitled "Unboxing the key human competencies for successful servitization". In this article, the principal problem addressed is the myopia of organizations in identifying and defining the competencies needed for new business models or new business contexts. To solve this problem, companies should invest in the ability to identify these new competencies. Specifically, the author analyzes the primary challenges facing companies in the transition from product-based organizations to service-based organizations and explores the set of competencies that underlie this transition. According to previous studies, a change in the characteristics of both the organization and the employees is essential for the successful implementation of servitization (Gotsch, et al., 2014). To face this change, organizations need to invest in the development of HC, observing the competencies salient to servitization (Gratton, et al., 1999). Moreover, the emergence of new business needs requires companies to implement new methods to pinpoint the competencies necessary to them (Athey & Orth, 1999).

The objective of this chapter is, therefore, to identify and implement a new and agile approach to supporting managers in future competency requirements during

the translation of the business strategy, ensuring the development of capabilities and solutions appropriate to services.

The methodological approach developed in this chapter is based on four main pillars: linking competency models to organizational goals, accounting for the organizational context, identifying competencies in a future-oriented perspective, and direct involvement of the leadership in the process. Based on these pillars, the study proposes a guide to identify the set of competencies that underpin servitization, also presenting a practical case to guide companies through a more efficient use of competencies in the servitization process, and highlighting a pattern of competencies that can be adapted to other organizational contexts.

Data were collected through interviews. Four main areas emerged from the analysis of the data collected: digitization; the energy sector; production and services; and business and technology. Subsequently, these business priorities were deployed in terms of specific requirements and KSAs, and were clustered into generic/transversal, job-specific, and managerial competencies.

The second publication is a book chapter entitled "Valorizing the human capital within organizations: a competency-based approach". This chapter explores how changes in the business environment and the nature of work require the implementation of integrated and flexible methodologies in defining competencies, in order to valorize HC and achieve organizational targets. Specifically, this article addresses the challenge of translating the strategy and vision of the organization into the knowledge, skills, and attitudes (KSAs) needed to perform well in a changing business environment.

According to Gratton, et al., (1999), in a business environment characterized by change, organizations face a double challenge: adapting and implementing the new business strategy effectively and quickly while also maintaining competitive advantage. These two challenges involve not only the business and financial aspects but also the processes and the people within the organization. Companies can address both challenges through identifying the core competencies that allow them to translate the strategy and vision of the organization into knowledge, skills, and attitudes (KSAs), terms that can be easily understood and implemented (Sanchez & Levine, 2009; Vakola, Eric Soderquist, and Prastacos, 2007). Nevertheless, this task is challenging because competencies in the majority of cases are defined prescriptively, in the form of job descriptions rather than as predictors of future needs (Sparrow, 1997). This scenario, in an environment characterized by change, brings the risk of immobility, providing a set of competency requirements that do not match the strategic orientation of the organization.

To overcome this trap, the core element of this study deploys—with the support of key figures in the organization— contemporary organizational strategic objectives and employee requirements in terms of KSAs. This research shows how, through the implementation of a competency model, it is possible to identify the main characteristics needed by the "employee of tomorrow" and the "manager of tomorrow" to succeed in a specific working environment with particular attention to soft skills. The competencies identified have been classified, using strategic targets as a starting point, into organizational core competencies, individual competencies and managerial competencies. This research, thus, provides corporations with valuable guidelines for identifying the future competencies needed. These could also be of use to business schools seeking to produce graduates who meet the exigent demands of the market.

The second area aims to provide evidence to answer SQ2: *How can HR practices serve as microfoundations for addressing organizational challenges through the valorization of HC?* It explores the role of training and, specifically, the promotion of a training culture within organizations as a strategic tool for seizing new opportunities through updating employee competencies and addressing their training needs in order to achieve strategic targets.

It includes two publications, the first of which is a journal article, "Training culture: a new conceptualization to capture values and meanings of training in organizations". The article was prompted by a clear gap in the literature: current studies on organizations focus more on informal learning and learning opportunities in daily work than on training. Despite this tendency, training still represents a crucial HR practice in enhancing HC development (Berk & Kaše, 2010). Furthermore, the scope and characteristics of training have broadened over the years to adapt to changes in organizations, work environments and the needs of individuals (Bartlett, 2001; Huerta, Audet, & Peregort, 2006; Kraiger, 2014), becoming not only an instrument to increase individual competencies but also a strategic tool to govern team processes and organizational outcomes (Bell, et al., 2017).

In light of these considerations, this paper aims to provide a framework to examine the meanings and values attributed to training within an organization by individuals, teams and the organization itself, in order to define a training culture profile that enables the organization to develop and implement more cohesive and effective strategies for training and development to enhance HC. This study examines the theoretical foundation and psychometric properties of the training culture scale (TCS), according to the deductive scale development process of Slavec & Drnovšek (2012). The results of the scale validation process show that the TCS

consists of 23 items within three dimensions: individual, group and organizational, supporting the researchers' initial hypotheses with good internal consistency and construct reliability.

This research represents the first attempt to develop and validate a scale to measure the training culture of an organization, recognizing the important role played by such a culture in defining how training is perceived and conceived within an organization by management and employees, and identifying possible gaps and improvement areas.

The second publication, entitled "The role of training in organizations: a comparative case study of employees and management perspectives", explores how the transition to a more collaborative way of working changed the role played by training in organizations. It compares management and employee perceptions and the impact of employee characteristics on the training culture.

The increasing complexity and competitiveness of the business environment require employees to manage multiple organizational challenges and changes (Kim, Hahn, & Lee, 2015). In this situation, training represents a strategic tool to maintain, update, and increase individual KSAs, as well as to prevent the obsolescence of HC at an organizational level and to develop organizational core competencies (Ballesteros-Rodríguez, De Saá-Pérez, & Domínguez-Falcón 2012).

Previous research, however, has shown a possible inconsistency in the managerial vision of training at different levels in the organization, as well as a prevalence of attention to the managerial perspective, with a lack of comparison between managers' and employees' points of view (Hasson, Tafvelin, & von Thiele Schwarz, 2013). Furthermore, while some organizational characteristics (e.g., industrial sector, size of company) have been examined as factors influencing training, there has been little exploration of individual characteristics (e.g., tenure in the organization, age and level of education) as predictors of different perceptions of training within the organization (McNamara, et al., 2012).

This study, therefore, attempts to compare managers' and subordinates' perceptions of training, identifying other factors with a possible influence on these perceptions. The study implemented the TCS validated in the previous article. The scale was tested on the sample through a principal component analysis followed by confirmatory factor analysis. The empirical findings show that managers' and subordinates' perceptions of training culture are similar in terms of the meaning and values attributed to training at individual and team levels but differ in the perception of the role played by training at an organizational level. This may be due to the different access the two groups have to information. Indeed, managers

may have a higher perception of the strategic role of training in the organization compared to their subordinates.

In terms of the factors influencing managers' and subordinates' perceptions of the training culture, the results show that gender is not relevant, while the role of the respondents in the organization, the unit they belong to, their seniority in the organization, and their level of education are significant in determining their perception of the training culture at an organizational level but do not have an impact on the meanings and values attributed to training at an individual level.

The third section aims to answer SQ3: *How can HR practices serve as microfoundations for leveraging HC development during organizational change?* The analysis focuses on employees' participation in work-related decisions during organizational restructuring, and studies the implications of the transformation process on HC development.

This section includes one article, aiming to understand to what extent involvement in decisions related to their job affects employees' well-being, job satisfaction, usefulness and productivity. The article, entitled "The impact of a participatory ergonomics intervention: the value of involvement", discusses the implementation and monitoring of a participative approach in a multinational company, during the restructuring of the plant, with the aim of improving well-being and production outcomes.

According to Hignett (2003), involving workers in the development of participative interventions is a key element in the success of the intervention. Furthermore, workers' in-depth understanding of their job and their ability to input useful information increase the likelihood that the intervention will be successful and help build trust and commitment, with a positive impact on job satisfaction and performance (Brown, 2002). Following these premises, this article sheds light on how participative approaches—based on the involvement of workers in the decision process—impact positively on job satisfaction, usefulness, occupational safety and fatigue and also on productivity.

The study takes the form of a longitudinal analysis before and after the participative intervention. The data collection was conducted via interviews pre- and post-organizational restructuring, allowing the researchers to obtain both quantitative and qualitative data to determine the impact of the intervention. The results reveal that the involvement of workers in decisions related to their jobs is effective, particularly in terms of usefulness, job satisfaction and organizational safety. The effect is less strong on repetitiveness and fatigue. During the period covered by this study, 36 workers were involved in the intervention and

successfully reintegrated in the production line. The management estimates a recovery of 69 working hours per day. In terms of productivity, the increase between 2009 and 2013 was calculated to be 1.5%.

5 DISCUSSION AND IMPLICATIONS

Research to date has failed to provide models able to examine how HR practices lead to HC development within organizations and which mechanisms play an important role in HC development in a business environment characterized by change. This research, therefore, aims to provide a conceptual framework that captures these elements by examining three main HR practices, considered to be the microfoundations of HC development: employee participation in organizational restructuring; training and the implementation of competencies' models as principal tools to renew and align HC with the strategic objectives in order to remain competitive and cope with the dynamic environment. This chapter provides answers to the research questions through the presentation, integration and discussion of the results of the five articles included in the dissertation. Finally, the contribution of the thesis to both theory and practice will be discussed.

5.1 Theoretical contribution

The objective of this study is to understand the role of HR practices in leveraging and supporting the development of HC in a changing environment, in order to meet business objectives. This dissertation addresses this theme through identifying three HR practices considered in the literature to be fundamental in promoting HC development. The HR practices analyzed are the implementation of competency modelling, training, and employee participation in work-related decisions during organizational restructuring. The three practices are analyzed through the five articles included in this dissertation. Each article contributes evidence to the general objective, answering the main research question and providing a solid contribution towards each sub-question.

At a general level, the theoretical contribution of this thesis lies in the reconceptualization of HC from a static and resource based definition to a dynamic capability. In the literature, HC is defined by its functional meaning, but is not considered a strategic resource for organizations operating in a dynamic environment (Philipps & Philipps, 2014), where the ability to continually reconfigure and adapt resources is essential (Teece, Peteraf, & Leih, 2016). The novelty of this thesis lies in defining HC as a dynamic capability that organizations have to extend, renew and adapt to fit strategic goals in continual evolution, in order to achieve superior performance through this fit between HC and strategic targets (Teece, Pisano & Shuen, 1997).

This thesis also makes progress in analyzing the microfoundations of HC development. Organizations can facilitate the alignment between HC and their

strategic goals and, thus, generate valuable and unique HC, investing in training and learning activities to develop employees' knowledge, skills, abilities and values (Branzei & Thornhill, 2006). This research identifies three HR practices as the microfoundations of HC as a dynamic capability, highlighting that internal resources are essential to the ability to respond to changes in the business environment, developing HC and, in turn, generating organizational uniqueness.

The first HR practice analyzed is the implementation of competency models. According to the dynamic capability theory of Teece (2007), organizations develop the ability to sense new opportunities by investing in the acquisition and/or development of individuals with the necessary competencies. This research uses two articles to answer SQ1: *How can HR practices serve as microfoundations for uncovering new HC competencies?* The first article uses a case study to demonstrate how a company investing in the ability to identify the competencies needed in a specific business and organizational context—in this case, servitization—develops its HC. The second article shows that the implementation of competency models favors the translation, and the definition of the strategy and vision, into core competencies and identifies patterns in existing competencies that fit the strategy and vision, allowing the development of HC.

In light of this evidence, the answer that this thesis gives to SQ1 is that organizations implementing agile competency models oriented toward the future can highlight crucial competencies that can translate the strategy and goals of the company into the KSAs needed to work in a more effective way. Compared to prior studies, which defined competencies prescriptively, more as job descriptions than as predictors of future needs (Sparrow, 1997), these articles identify and implement an integrated approach, to help managers translate the business strategy to future competency requirements, ensuring the development of capabilities appropriate to the organizational context—in this case, services and solutions—and the development and valorization of HC. Indeed, the implementation of competency models enables the identification and development of the KSAs in the members of the organization who together constitute the HC of the organization.

Furthermore, this study has methodological implications; indeed, the methodological approach developed in this research is based on four main pillars that explain how HR practices serve as microfoundations for discovering HC competencies. They do so by linking competencies models to organizational goals, accounting for the organizational context, and identifying competencies in a future-oriented perspective, through the direct involvement of the leadership. On the basis of these pillars, the study presents a guide to identifying the set of

competencies appropriate to the organizational context, helping companies to a more efficient organizational use of competencies and highlighting a pattern of competencies that can be adapted to other organizational contexts. These two studies show that the implementation of competency models offers a number of benefits to decision-makers and HR professionals, because the definition of competencies represents the basis for many HR activities, serving as a starting point and foundation for identifying the needs for training and development activities and maintaining a strong link with the strategy and direction of the organization. The output of this first part of the research creates the foundations for developing the second part.

On the basis of the evidence from the first part, the research focuses on a second HR practice: training. According to the dynamic capability theory of Teece (2007), once a new opportunity is sensed, it must be addressed through new and innovative solutions. From an HC perspective, therefore, a company can seize opportunities through training, developing new employee competencies to adapt to the change. The research answers SQ2: *How can HR practices serve as microfoundations for addressing organizational challenges through the valorization of HC?*

This study answers the research question by examining the role of training and, specifically, the promotion of a training culture within organizations as a strategic tool to promote the updating of employee competencies that enable the organization to face organizational challenges and achieve its strategic targets through the development of HC. This study identifies training as one of the most value-enhancing HR practices to be implemented in a complex and competitive business environment, where employees need to adapt to the change process. It can be used as a strategic tool to maintain, update, and enhance individual KSAs as well as to prevent the obsolescence of HC at the organizational level (Ballesteros-Rodríguez et al., 2012). Investing in training and learning activities is essential to facilitate the alignment between individual HC and strategic goals and, in turn, to generate valuable and unique HC that gives the organization the ability to respond to future contingent events in a unique way, difficult for competitors to imitate (Berk & Kaše, 2010).

The first article defines training as a subset of the main organizational culture, providing a framework to examine the meanings and values attributed to training within an organization at the individual, team and organizational levels. The definition of a training culture profile enables the organization to develop more cohesive and effective strategies for training and development, contributing to the generation of a higher level of HC. The second publication illuminates how the

transition to a more collaborative way of working changes the role played by training in organizations, comparing management and employee perceptions and the impact of employee characteristics on it. The empirical findings show that managers' and subordinates' perceptions of training culture are similar in terms of the meaning and values attributed to training at the individual and team levels but differ in their perceptions of the role played by training at the organizational level. This may be due to the different access to information available to the two groups. Indeed, managers may have a higher perception of the strategic role of training in the organization compared to their subordinates.

In terms of the factors influencing managers' and subordinates' perceptions of training culture, the results show that the role of the respondents in the organization, the unit they belong to, their seniority in the organization, and their level of education are significant in determining their perception of the training culture at the organizational level but do not have an impact on the meanings and values they attribute to training at an individual level.

Moreover, this study also has methodological implications: it proposes the first definition and validation of the concept of training culture, presenting evidence of its validity and a scale for its measurement. The implementation of the TCS brings relevant information and insights into how training is perceived within an organization by management and employees, highlighting possible gaps and areas for improvement when the data show a marked difference between the perceptions of employees and management.

Finally, the third HR practice considered in this research is employees' participation in work-related decisions during organizational restructuring. According to the dynamic capability theory of Teece (2007), transforming frequently occurs as a consequence of a crisis that demands a significant change in the way of operating. Transforming means implementing new systems or processes and the role of leadership is to facilitate the change (Teece, Peteraf, & Leih, 2016). In this article, the researcher aims to answer SQ3: *How can HR practices serve as microfoundations for leveraging HC development during organizational change?* In the context of organizational transformation, employees' unwillingness to change can translate into work-related risk factors which hamper job satisfaction and performance.

The study addresses this issue and answers the research question by implementing a tailored participatory approach that demonstrates that organizations can develop HC through employees' participation in work-related decisions, raising trust, involvement and commitment toward organizational change interventions and minimizing the risk factors. Thus, the answer to SQ3 is that HR practices can

leverage HC development during organizational change through the direct involvement and participation of employees in decisions related to their jobs. The contribution of this study lies in the implementation of a participatory design to secure the optimization of results, the identification of facilitators and barriers, and the monitoring of all aspects related to the implementation and delivery of organizational change interventions, promoting employees' readiness and involvement in the transformation process. The results obtained through this longitudinal study show that the implementation of a participatory approach has a positive impact on employees' perception of their usefulness, job satisfaction and organizational safety as well as on productivity.

Finally, this thesis fills the research gap originally stated, by demonstrating the key role of HR practices in a changing environment and the power of tailoring and adapting them to the organization. In this way, they become instrumental in developing unique HC, through which the organization achieves competitive advantage. People indeed have been proven to be a determining factor in the success of an organization. By enhancing HC through the implementation of HR practices, employees develop valuable, rare, and specific competencies, and organizations, on the basis of its firm-specific HC, can attain competitive advantage that is difficult to imitate.

Table 4. Summary of the main findings

Research Question	Article	Key Findings
SQ1: How can HR practices serve as microfoundations for uncovering new HC competencies?	Article I	Organizations develop the ability to sense new opportunities in a changing business context through investment in the acquisition and/or development of individuals with the necessary competencies Competency models serve as microfoundations for translating the vision and strategy of the organization into competencies that allow the development of HC The translation of the business strategy to future competency requirements (through the implementation of competency models) ensures the development of capabilities relevant to the organizational context

	Article 2	The definition of the right competencies represents the basis for many HR activities, serving as a base for identifying training needs, maintaining a strong link with the organizational strategy A practical case to guide companies through more efficient use of competencies in the organization A pattern of competencies that can be adapted to different organizational contexts
SQ2: How can HR practices serve as microfoundations for addressing organizational challenges through the valorization of HC?	Article 3	Companies can utilize training as a key tool for seizing new opportunities Companies can develop new competencies in employees to adapt to organizational change through training Definition of training culture as a subset of the main organizational culture, providing a framework to examine the meanings and values attributed to training within an organization The training culture profile of an organization: - helps to develop more cohesive and effective strategies for training and development - contributes to the generation of a higher level of HC in line with the strategic orientation of the organization - develops the ability to respond to future contingent events in a unique way, difficult to imitate.
	Article 4	Managers' and subordinates' perception of training culture is similar in terms of the meaning and values attributed to training at individual and team levels, with some differences in the perception of the role played by training at organizational level Managers have a higher perception of the strategic role of training in the organization
SQ3: How can HR practices serve as microfoundations for leveraging HC development during organizational change?	Article 5	Organizational transformation consists of the implementation of new systems or processes Implementing a participatory approach, involving employees during organizational transformation has a positive impact on employees' usefulness, job satisfaction and organizational safety as well as on productivity
RQ: How do HR practices favor and contribute to human capital development in changing organizations?	All articles	Tailoring and adapting HR practices to the organization and its strategic orientation and goals make them instrumental in the company's development of unique HC, achieving competitive advantage through people. Through HR practices, employees develop valuable, rare and specific competencies that constitute the HC

5.2 Managerial implications

The articles included in this dissertation have all been designed to bring practical insights to the organizations involved in the study. This research represents a collection of specific cases in which the author, together with the companies and public sector organizations involved, tried to shed light on how HR practices can be implemented to enhance HC through the development and testing of ad hoc methodologies. Managers and executives have been directly involved in the implementation of the HR practices, data collection and discussion of results.

The novelty of this research lies in the fact that is practical research with real and tangible utility for companies, while still respecting the criteria of scientific research. In each article, the authors state the practical problem addressed, the possible solutions from the scientific literature, and how to solve the problem through the use of participative methods and bottom-up approaches.

This research brings two main contributions for the organizations: first, it proposes strategies and solutions for connecting HC with the organizational objectives through the definition of competencies needed to perform well in an organization in a future-oriented perspective. This, in turn, allows tailored training programs, able to fulfill the needs of the organization and to address future challenges by developing a common training culture.

Secondly, it provides clear evidence to managements that including employees in decisions related to their jobs increases their job satisfaction and sense of usefulness as well as their productivity. The methodologies applied in this research are applicable to different business sectors and types of industry, producing valuable insights into how managements may achieve business objectives through investing in people.

5.3 Limitations and recommendations for future research

This dissertation, in common with any research work, has some limitations that must be noted and may become useful suggestions for future research. As each article discusses its own limitations, this chapter focuses on the limitations of the dissertation at a more general level. The results of this research work can be considered as a preliminary attempt to examine HR practices as microfoundations of HC development, an attempt which needs further development for two reasons.

Firstly, this research limits its attention to three HR practices as microfoundations of HC development: employees' participation in organizational restructuring, training, and the implementation of competency models. These practices were chosen as they were considered the most relevant in the literature. Nevertheless, future research should focus on developing this perspective, including other HR practices, such as the selection of employees, staffing levels, performance management, communication, compensation, and rewards and incentives, analyzing them as factors for HC development.

Secondly, this research comprises a collection of cases carried out in different companies and sectors of industry. The results are not, therefore, industry-specific; future research might extend the findings by focusing on the characteristics of a specific industrial sector, verifying how this impacts on the results.

Moreover, mixed-method research must make a specific distinction between the limitations of quantitative and qualitative studies. Of the quantitative studies, two out of three articles, specifically Articles 4 and 5, are company-specific, meaning that the methodology has been implemented in one company. The results are exhaustive but further research and applications of the methodology would allow the complete generalizability of results. Furthermore, only one study (Article 5) is based on longitudinal data. Longitudinal data would be desirable for all the studies to better understand the effects and impact of the change process on the results.

The qualitative studies included in this dissertation (Articles 1 and 2) represent the development and implementation of a case method that does not allow further generalizability of the results. This opens the door for the competency model developed through this study to be applied in different sectors to verify its applicability and utility in different industry and business contexts. Future research could be aimed at investigating how the digital transformation of organizations impacts on the implementation of competencies' models and what characteristics are needed to facilitate the development of HC during the digitalization process.

Thirdly, this research intentionally focuses on internal resources as the key factors in developing HC and organizational uniqueness. Future research could combine internal and external resources.

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Publications

Unboxing the key human competencies for successful servitization.

Federica Polo

12.1 INTRODUCTION

Servitization is the process that changes the business models of firms from selling products and rudimentary services to delivering customized solutions (Baines et al., 2007). This process, however, brings serious challenges to organizations regarding organizational strategy, transformation, and the acquisition of service capabilities (Oliva and Kallenberg, 2003; Wise and Baumgartner, 1999). Traditionally, manufacturers nurture specific competencies related to either technology or products' offerings, which, in turn, develops myopia towards other competencies particularly the services-related (Neu and Brown, 2005). To overcome this trap and facilitate servitization, manufacturers ought to invest in the development of capabilities proprietary to the design of services and their integration into customer-specific solutions, selling and delivery (Paiola et al., 2013). Therefore, the successful implementation of servitization requires a substantial change of existing characteristics of traditional industrial organizations and necessitates employees with new qualification profiles composed of complementary and necessary competencies (Gotsch, et al., 2014).

In this context, organizations undergoing servitization need to ensure the sustainability of competitive advantage in the long run by investing in their processes and human capital (Gratton et al., 1999). Nevertheless, before such a decision takes place, organizations should be able to uncover the competencies salient to servitization. In this regard, firms must seek to answer the following question: for a successful servitization, what competencies should employees possess and how can these competencies be defined in the long run?

In response, the present chapter contributes to the servitization community (managers and scholars) by exploring the set of competencies that can undergird servitization. By so doing, this chapter seeks to provide valuable guidelines to corporations for the implementation of a competency-based model that helps the top management identify the competencies that service employees should possess, and highlight competencies that could translate the strategy and vision of the organization into behaviors, skills, and terms that people can easily understand and implement (Sanchez and Levine, 2009).

12.2 COMPETENCIES DEPLOYMENT IN SERVITIZATION PROCESS: STATE OF THE ART

12.2.1 Definition of competency

In the literature, there is a conceptual ambiguity and lack of consensus on the definition of competencies (Robinson et al., 2007; Shippmann et al., 2000). For some, the concept refers mostly to behavioral aspects, while for others the term connects to abilities and personal characteristics, other researchers also subsume the outcomes of actions in the definition of competency (Iles, 2001). Given this multifaceted nature of competency that behooves a comprehensive view, it should be considered as a construct (Lahti, 1999) that is not directly observable and measurable but based on measurable and observable data. In light of this, competency is defined in this chapter as a set of observable dimensions comprising knowledge, skills, abilities, behaviors, and values that are necessary for effective performance in the job in question (Shippmann et al., 2000). These dimensions are tailored to the specific nature and needs of the organization and customized for the business objectives and strategy (Rodriguez et al., 2002). Although most interpretations explicitly narrow the concept of competency to the individual level, many conceptualizations extend the focus to the team and organizational level (Robinson et al., 2005). However, this chapter pictures the three levels as strictly interrelated and form joint organizational competencies that are embedded in the strategy formulation process (Fleury and Tereza-Fleury, 2003). Therefore, the set of organizational competencies required within the organization should be determined and operationalized to support and improve the competitive strategy of the firm (Fleury and Tereza-Fleury, 2003).

12.2.2 Competency Modeling in Servitization

The transition from product-based firm to service-based firm implies the re-alignment of employees to the new strategy and goals, which carries an impact on both individual competencies and organizational capabilities. Naturally, with the emerging new business needs related to servitization, it seems necessary for companies to implement new methods to face the change in competencies identification (Athey and Orth, 1999). In this regard, competency models act as a guide for the organization in the identification and deployment of new competencies tailored for servitization. The implementation of competency-based methods in servitization requires a shift in perspective from the individual level of analysis - in the definition of specific skills and behaviors - to the organizational level. Indeed, organizational and process competencies need to be jointly identified within the organization to combine and leverage individual knowledge, skills, and abilities (KSAs) to increase organizational advantage (Athey and Orth, 1999). As Figure 1 illustrates, the competencies' definition process is a continuous loop between individual and organizational level. Indeed, organizational competencies are created when individual KSAs are broadly shared across the organization (Dai et al., 2012). In turn, it becomes fundamental for the organization to define and manage the individual KSAs to support specific organizational competencies and strategic directions (Lawler, 1994). Therefore, competencies, defined as KSAs, need to be directly linked to business objectives and strategy (Campion et al., 2011). The attempt of aligning competencies to organizational goals during servitization can generate particularly complex or multidimensional patterns. In this regard, an appropriate use of competency models facilitates and simplify the identification and definition of the required competencies. Furthermore, when competencies are identified in light of the strategy, it becomes important to deploy them in terms of observable job behaviors to help employees understand them and ensure a successful implementation of the strategy (Vakola et al., 2007).

In light of these considerations, the following paragraph, based on the extant literature and practical insights from real case companies, outlines the main characteristics that competency models should have for a successful implementation of servitization strategy.

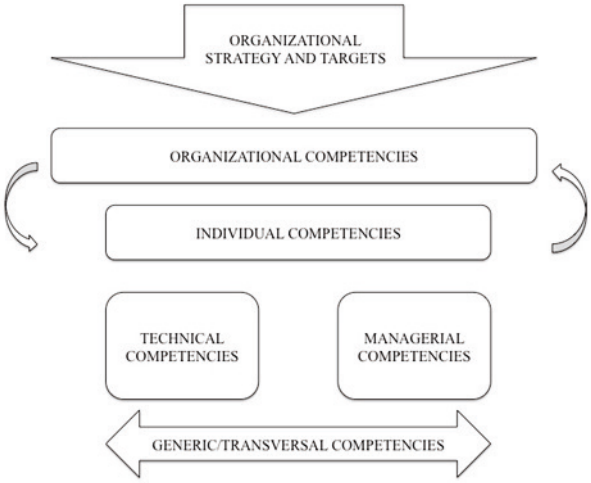

Figure 12.1 Competency framework for servitization (Developed from (Campion et al., 2011))

12.2.3 Characteristics of Competency Models in Servitization

As previously mentioned, competency models have a crucial role in linking together individual KSAs with the organizational strategy. Moreover, they are implemented to facilitate the identification of competencies required to better perform in a specific job, organization or industry (Shippmann et al., 2000), as well as the evolution and definition of the needs related to changes in the business environment due to servitization (Athey & Orth, 1999). However, changes in business needs and the nature of work (e.g., the necessity of real-time knowledge work in the case of servitization) have risen several challenges to consider in the implementation of competency methods, which in turn suggests the adaptation and amendment of these methods to face changes (Athey and Orth, 1999). Figure 2, exhibits the four main pillars for the implementation of competency models in servitization, described below.

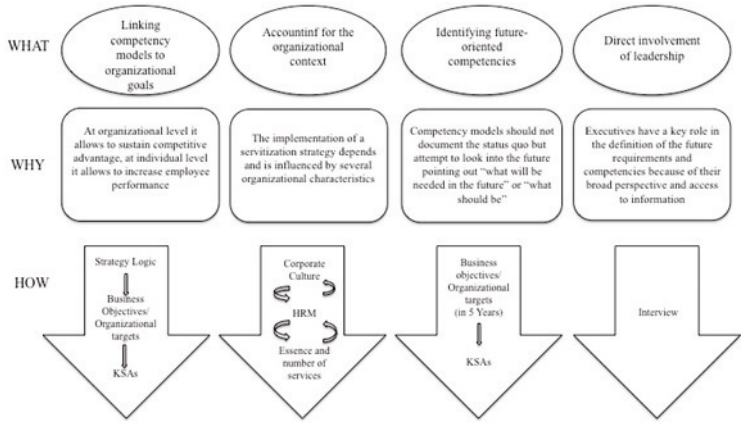

Figure 12.2 Competency Models in Servitization: What, Why and How?

1. *Facilitate servitization by linking competency models to organizational strategy and goals:*

The effectual implementation of servitization is strictly related to the understanding of the company's strategic logic (Rabetino et al., 2017). Therefore, the focus should be oriented to the logic behind the strategy implementation, rather than the strategy itself (Kaplan and Norton, 2006). The connection between strategic logic and soft organizational factors is a very crucial and critical point in service-oriented organizations (Homburg et al., 2003). Understanding the logic behind the strategy allows the deduction of specific business objectives and organizational targets, based on which the KSAs needed to achieve them are defined. Deploying the competencies needed for organizational strategy and goals and translating them into observable KSAs supports their understandability and applicability and that of the strategy itself (Vakola et al., 2007). Moreover, the integration of employees' competencies and business strategy plays a very important role both at the organizational level (in sustaining competitive advantage) (Barney, 1991) and at the individual level (in performing better the job aligning their competencies to the business strategy).

2. *Facilitate servitization by accounting for the organizational context:*

Competency models should be developed and tailored to the specific organizational context. The implementation of a servitization strategy depends on and is influenced by several organizational characteristics. For instance, corporate culture and human resource management need to be taken into consideration in the strategy implementation (Davis, 1983), as well as in the competencies'

deployment for its effective implementation. Further elements characterizing the organization in the servitization process are the typology and number of services offered by the organization (Homburg et al., 2003). All these elements characterize the organization and need to be included in the competencies' definition.

3. *Facilitate servitization by identifying future-oriented competencies:*

Competencies are usually defined by comparing past behaviors, rather than anticipating future performance requirements. After reviewing the extant literature, we can affirm that competencies deployment is mostly the result of the comparison between people considered as high performers and people considered average performers within an organization (Athey and Orth, 1999). To support servitization, it is therefore important to change this perspective. Consequently, competency models should not document the status quo, but attempt to look into the future (Campion et al., 2011) pointing out "what will be needed in the future" or "what should be done" for a successful implementation of servitization.

4. *Facilitate servitization through the direct involvement of leadership in implementing competency models:*

Even though it is not possible to predict the future with certainty, organizations have some insights about future business directions in terms of products, services, markets, resources, challenges, and competitive issues. As mentioned by Campion et al. (2011), executives and top managers have a key role in the definition of the future requirements and competencies because of their broad perspective and overall view, access to information on new developments, business changes and needs, and role in shaping the future of the company. Therefore, involving them in competencies' definition allows their support for the project, which becomes one of the most important advantages of competency modeling (Campion et al., 2011).

12.3 COMPETENCIES DEPLOYMENT IN SERVITIZATION: A SYSTEMATIC APPROACH

12.3.1 Methodological Approach

Identifying the most appropriate and effective methodology in organizational analysis always represents a complex issue. Indeed if, on the one hand, the aim is to implement the most accurate modality of observation; it is, on the other hand, necessary to consider the lack of time and resources to dedicate to these activities especially in larger organizations (Athey and Orth, 1999). Moreover, the complex

procedures proposed in traditional approaches to competency modeling are worthless for organizations involved in servitization, where the structure, processes, and requirements are rapidly changing (Vakola et al., 2007). To face this problem, it becomes important to identify an agile processual methodology that ensures the effective implementation of a competency-based model in the organization. In the case of competency models, the literature (e.g., Campion et al., 2011) suggests a focus on the core idea; not every detail needs to be included to facilitate the implementation and maximize the results. Therefore, the proposed methodology permits to identify a set of competencies needed during the servitization journey to implement the business strategy and work effectively at both individual and team levels. The goal is to propose a vademecum for the applicability of competency models. This guide will help companies to identify the competencies required to implement the servitization strategy in the long run successfully. The following section describes in detail each step based on the literature.

Identification of the main objectives a company seeks to achieve through servitization: (This step answers two questions: how to identify the underlying objectives? And who are the main actors to include in the identification process?)

Research shows that the most controversial aspect managers need to face is the translation of the strategy into individual competencies required to implement and operationalize the business strategy effectively (Kaplan and Norton, 2005). Frequently, organizations adopt a prescriptive approach to competencies providing job descriptions aligned with the strategic objectives (Sparrow, 1997). This approach implies a static view of competencies focused on what the organization already does (Vakola et al., 2017). Therefore, to dynamically adapt to the strategy evolvement, it becomes important to start the competencies' definition based on the organizational objectives the company is going to achieve in a future-oriented perspective. This approach is based on the initial identification of the organizational targets, interviewing the most relevant actors within the organization (Campion et al., 2011) to draw an overall picture of what is the foundation of core business areas and what is the strategic direction the company is going to undertake. Indeed, through interviews or focus groups with executives and top managers, it is possible to depict the future directions, markets, resources, challenges, and competitive issues the company is going to undertake.

Definition of the organizational targets within a time frame: (This step seeks to answer two questions: What is the most appropriate timeframe to consider and why? And why is it important to define competencies in a future-oriented perspective?)

One of the most important elements in the determination of future competency requirements is to establish how far we want to seek into the future (Robinson et al., 2007). The definition of the time frame is a crucial passage because looking at the immediate future we risk identifying competencies that are slightly different from the current ones. On the other hand, looking too far we risk to speculate rather than provide an accurate prediction (Robinson et al., 2007). Gow and McDonald (2000) suggest that the future time horizon should be a minimum of 5 years.

As mentioned before, competencies are commonly defined through the comparison of the top with the average performers. At best, this approach tends to focus on the present; at worst, it dwells on the past (Iles, 2001). Adopting such a perspective in a transition period constitutes a risk for the organization that might become stuck in the past (Robinson et al., 2007) rather than look ahead through the competencies' definition. Therefore, the ability to forecast future requirements represents a strategic leverage for the organization depicting hypothetical future scenarios and predicting future business changes. The interviewer/researcher should support executives and managers by delving beyond vague images of the future to identify specific features that describe how the business should operate successfully in the future (Athey and Orth, 1999).

Translation of organizational targets and organizational level competencies into individual competencies via KSAs: (This step seeks to answer two questions: What kind of approach to adopt? And how to identify individual competencies?)

The choice of the right approach to defining competency requirements has been debated extensively in the literature. The two main streams can be classified as top-down and bottom-up approaches (Robinson et al., 2007). In the top-down approaches, competencies' definition is carried out by a previously defined set of competencies to which we re-conduct the competencies needed for the specific job analyzed. On the contrary, the bottom-up approaches aim to explore data without any pre-existing competency frames. In this research, a bottom-up approach was adopted. Although bottom-up approaches are more demanding and time-consuming, they ensure major adherence between the identified competencies and the role analyzed as opposed to competencies defined through top-down approaches (Robinson et al., 2007).

The investment in the deployment of individual competencies may vary following the needs and resources available in the organization. Lathi (1999) suggests six main steps for defining individual competencies: the first step is represented by (1) the review of the available documentation: company policies, strategic view, mission, and vision; whereby (2) the targets to achieve are defined. Once the main

goals are identified, it is important to (3) identify the process and criteria for collecting information (e.g., methodology, actors to involve, information to seek…etc). Consequently (4) information is collected and (5) elaborated following the criteria of accuracy, importance, and representativeness. Through this process, we (6) define the competencies at the individual level.

Adoption of granularity in the definition of competencies: (This step seeks to answer one question: How many details should be included in the definition of competencies?)

The number of details to include in the competencies' definition is one of the main challenges to face in the implementation of competency models. This problem emanates from an obsession with detail on the one hand, and the need for simplification and usability on the other (Shippmann et al., 2000). Therefore, the suggestion that comes from the literature is not only to limit the number of competencies identified, but also to reduce the amount of detail in the description of each competency (Campion et al., 2011).

Emphasis on the distinction between different competencies' layers: cross jobs, job-specific and managerial competencies: (This step seeks to answer one question: How to categorize the identified KSAs?)

In order to create a detailed but efficient competency framework, it is necessary to identify the individual level competencies following the organizational level competencies, and to categorize them according to generic/transversal competencies (common to different jobs and required in several circumstances to better perform), job-specific competencies (required to perform a specific job), and managerial/leadership competencies (specific of managerial roles).

Definition of a methodology for the collection and elaboration of data: (This step seeks to answer one question: How to collect data, how to corroborate evidence, how to counterproof evidence?)

Data can be collected using different methods such as interviews, observations, focus groups to identify potential competency information (Campion et al., 2011). The sample of people to interview should be broad enough to represent a range of business units and offer diverse and complementary perspectives on the future orientations and needs of the organization (Robinson et al., 2007).

The transcripts of the interviews/focus groups/observations are subject of a content analysis to identify the most recurrent themes and the indicators behind them (Kandola and Pearn, 1992). Approaching the content analysis, without

preconceptions and with the support of an external observer, ensures that the indicators emerge in a bottom-up manner (Robinson et al., 2007). As described in Figure 3 the emerged indicators need to be organized in a matrix that will summarize the future of the business along with several key organizational criteria or characteristics (Athey and Orth, 1999). Subsequently, these business priorities need to be deployed in terms of specific requirements and KSAs. Once identified, the KSAs are classified into generic/transversal, job-specific and managerial competencies. Finally, it is necessary to examine and redefine the competency framework with a panel of experts from the organization to ensure comprehensiveness and understandability of the framework.

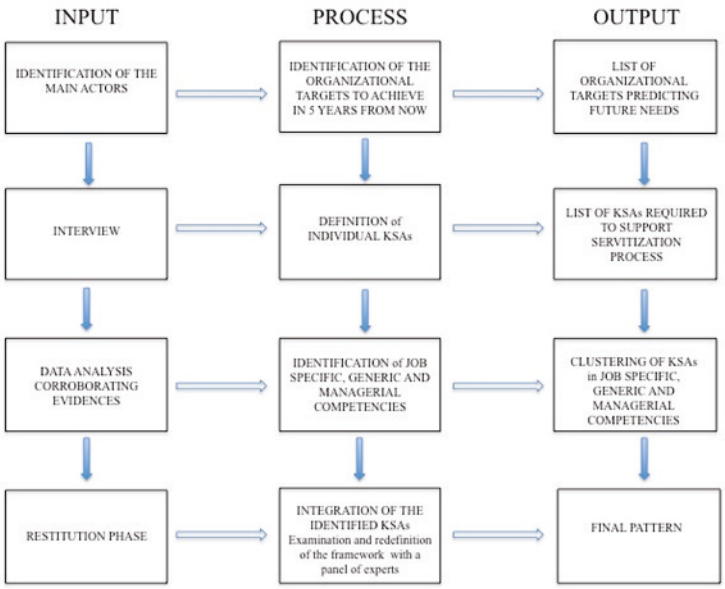

Figure 12.3 A Systematic Approach to Competency Deployment is Servitization Process

12.3.2 An illustrative case example

The case company where the methodology was developed and tested is a large company operating in the sector of advanced technologies and lifecycle solutions for marine and energy sector. During the case study, the company has undergone the transition from products to services and integrated solutions.

The competency model implementation started with the identification of the main actors, from each unit, to involve in the project. The criteria adopted in the selection of key figures to interview were the role and access to relevant

information of the candidates. The competency model implementation witnessed the involvement of 1 Chief, 6 Vice-Presidents, 15 Directors, 7 General Managers, 2 Managers, 2 Project Managers, 1 Senior Proposal Engineer.

Data were collected through interviews (face to face or via teleconference). The duration of each interview was 30 minutes on average. Four open questions were used to stimulate the discussion. The time frame adopted for the definition of the main targets, the company is going to achieve and the consequential competencies needed, is 5-10 years, as suggested in the literature and confirmed through a follow up with the managerial team. Once data were elaborated, the results have been discussed with a panel of experts within the organization to verify their robustness.

From the analysis of the interviews, we identified four main areas of focus for the company in the next years, summarized as follows: digitization; energy sector; production and services; business and technology. Subsequently, these business priorities were deployed in terms of specific requirements and KSAs and were clustered into generic/transversal, job-specific and managerial competencies. In this chapter, the results are presented in a summarized and narrative version to give the reader an overview of the outcomes the company obtained through the implementation of a systematic competency-based methodology.

Data revealed that, in the long run, the company would go through an increasing need for services related to products updating and upgrading during their life cycle. As a consequence, it is necessary to develop a good product and system understanding. Moreover, the company is moving from selling products to selling solutions, integrating different systems. To implement this change of perspective effectively an increase of technical capabilities of all professionals is required, and particularly for salespeople to have a better technical understanding of the solutions sold. Furthermore, the focus on solutions requires also competencies in process understanding and process design.

One element emerged as a crucial factor in sustaining servitization is the need for professionals that have both the business understanding and technical capabilities, can combine different disciplines and have a strong ability to think at the system level. There is the need to combine the business and engineering acumens to ensure that the technical experts have also a business mindset and can think strategically, while the business experts possess technical capabilities and can understand the products and solutions of the company. The strategic mindset is a crucial characteristic; employees will need it for all business functions, especially to understand how to enter new businesses and conduct market analysis. Also, the ability to use and adapt technology to create new businesses and improve operational effectiveness is strongly required.

The central element will be the customer value and centricity. The company is selling full solutions that need to bring value to the customer. The key competence to meet this requirement is the ability to understand how to create value for the customers. This is possible combining a very deep technical understanding, that allows implementing a value-based selling, and a positive attitude towards clients, understanding their interests and point of view.

Furthermore, it is important to develop competencies in big data analysis in order to provide the company crucial information to customize solutions and products on the basis of customers' needs. For instance, understanding customers' needs allows the firm to operate cost-effectively. Moreover, digitizing the delivery chain, sharing information with the customer and planning the delivery time would add value to the customer. Therefore, the ability to maintain the relationship with the customer is a key element in the value creation process.

In order to meet these requirements, generic/transversal competencies are considered crucial within the organization to work effectively. In particular, communication among people and team members is considered a key element to maintain a good working climate. The communication includes the ability to build relationships and to understand people. Another important element is the ability to select and extrapolate the information needed out of a discussion, avoiding misinterpretations and stereotypes. Moreover, it is important to develop employees' presentation skills regarding the ability to summarize and prioritize information and transmitting the message clearly to impact the audience.

Today, the work dimension is the team. Therefore, employees need to be able to work in groups, collaborating and co-operating with colleagues, developing effective reporting skills and the capacity to share information and responsibility. The core of teamwork is the ability to combine different expertizes and competencies profitably.

The case company operates in a global environment; employees need to be prepared to work in global networks as well as in a virtual environment. Therefore, employees need to develop social skills in a virtual environment, as well as the awareness and understanding of the multicultural context in which the communication occurs. Indeed, the knowledge and skills regarding cultural intelligence are very recommended to work efficiently in global networks. Furthermore, to facilitate the relationship with the customer is very well recommended the ability to speak different languages, to tear down the barriers between seller and customer.

Regarding the promotion and maintenance of a good organizational and group climate, employees need to have a good approach towards learning and the right attitude towards change, developing a mindset that enables the change. Being open, questioning and challenging the findings and facts is crucial to working efficiently in the organization as well as the stress management and agility in programming and managing the work in critical situations, when people need to find solutions and revise their plan fast.

The basics of negotiations and the ability to sell ideas internally and externally are well recommended as well as a good attitude towards problem-solving. In the next years, firms will need professionals with different characteristics in different areas. There will be the need for professionals with a strong technical background and solid knowledge in their field "experts" as well as the need for more adaptable and flexible professionals with extrovert and communicational personality, able to create new business occasions, to lead teams and bring innovations into the organization.

The work in the company is becoming more and more project-oriented. Therefore the service employee should have a flexible way of working, changing fast and working with uncertainty. Moreover, working on projects requires the capability of bringing and adapting the individual way of working to the project, sharing it with all the project members.

The results of the interviews show that the manager in service-based organizations will still need a deep technical understanding but will not be the best expert on the team anymore. Indeed, he/she will need to have the ability to lead and guide the group, uncover their potential, and foster the creation of a good work environment. Moreover, the manager will be a team member. Indeed, the managerial model will not be hierarchic and centralized anymore, but it will be based on autonomy and shared responsibilities among the group members.

The manager will coach people, challenge them and give them the opportunity to develop and implement their competencies. He/she will have a support function enabling others to work efficiently. He/she should be capable of motivating and empowering people. For this reason, good communication skills, adopting new ways of share information, and the ability to listen to people and understand their needs are important. Moreover, the manager of service-based organizations is reachable by people and able to transmit trustworthiness even when absent.

An interesting aspect arisen is related to problem-solving. Indeed the manager will not provide answers to problems but will create the circumstances and support

problem solving within the group as well as he/she will involve people in decision making.

Social skills will be crucial for managers in leading the team, for instance, empathy in understanding people needs and in respecting diversity has been stressed as a fundamental aspect. Indeed, respondents highlighted that promoting the success of an organization is not only about completing tasks, but also about the individuals behind the tasks. Therefore, the manager should be able to adapt his/her style to people's characteristics. In fact, there can be team members that might need more micromanagement and guidance, and other members that like to work in autonomy.

Last but not least, the manager in service-based organizations has a good business acumen, with a global vision about business, and the ability to combine different factors. Strategic thinking and planning will be the key elements in order not only to run the business today but also to develop it for tomorrow.

12.4 CONCLUSION

Despite the considerable amount of research on servitization, the implementation of competency methods as tools for the re-alignment of organizational and individual competencies to the new business needs remains little explored. Throughout the years, scholars stressed the importance of the integration of competency methods and business planning processes as leverage to emphasizing future emerging competencies to facilitate and accelerate the change (Athey and Orth, 1999). Nevertheless, this topic still finds little room for application in the everyday business life, where companies usually invest a huge amount of resources in the initial phase of competencies analysis neglecting the importance of sustaining the implementation of the competency models in the long run (Campion et al., 2011). Therefore, this chapter offers to companies undertaking the servitization journey an integrated and flexible approach to help managers in the translation of the business strategy in future competencies requirements, ensuring the development of capabilities proper of services and solutions. Furthermore, the practical case presented in this chapter can guide companies through a more efficient use of competencies in the servitization process, as well as points out a pattern of competencies arisen in the case company analysis that can be adaptable to other organizational contexts.

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Valorizing the human capital within organizations: a competency based approach.

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Abstract. Changes in the business environment and in the nature of work itself require the implementation of integrated and flexible methodologies in competencies' definition in order to valorize the human capital and achieve organizational targets in a future-oriented perspective. However, extant research suggests that the available approaches to competency definition are more focused on describing past behaviors than on anticipating future requirements. Therefore, this study endeavors to provide a competency-based model that supports the top management in the identification of the competencies employees should posses, highlighting crucial competencies that can translate the strategy and vision of the organization into behaviors, skills, and terms that people can easily understand and implement. The results of our explorative case study led us to identify a set of competencies (digital/ analytical/ technical/ adaptive/ combinative/ proactive), classified following the Knowledge Skills Attitudes (KSA) model, that collectively lead to a successful definition of future-oriented competencies.

Key words: competencies · competency based methodology · strategic change · human capital · competency definition · (KSA) model · participative approach

1 Introduction

Organizations operating in changing business environment face a double challenge: the adaptation and implementation of the new business strategy in the most effective and quick way possible, on one side, and the need to sustain competitive advantage on the long run, on the other side [9]. These two challenges do not involve only business and financial aspects but also the process and people within the organization [9]. Therefore, the identification of core competencies becomes a strategic leverage to face both challenges, and it has a crucial role in

translating the strategy and vision of the organization into knowledge, skills, and attitudes (KSAs), terms that can be easily understood and implemented ([30]; [22]). Furthermore, the growth of competition and technological innovation entails a substantial transformation of the business environment and of the nature of work, shifting from a static perspective to a more flexible and dynamic way of operating [4]. As a consequence, work tasks and skills are subject to constant change and adaptation [11]. In this situation, the definition of core competencies becomes important to link individual knowledge, skills, and attitudes (KSAs) to the organizational strategy and goals. Therefore, the implementation of competency models supports organizations in identifying patterns of core competencies to better perform a specific job, organization, or sector [25]. However, the changes in business needs and in the nature of work have made the implementation of competency models more complicated than before [1]. In the literature there are several examples of competency models' implementation, nevertheless, most of them are mainly oriented on describing past behaviors rather than pointing out competencies needed in the future [1]. Although this approach is worthy in some specific situation, in a context characterized by change it brings the risk of immobility, providing a set of competency requirements that do not match the strategic orientation and goals of the organization.

Therefore, the aim of this research is to provide insights for the definition and implementation of a competency-based model, highlighting crucial competencies that can translate the strategy and goals into KSAs needed to work in a more effective way in the organization.

2 The concept of competency

In the literature, there are several definitions of competency and competence at different levels: individual, group and organization ([19]; [10]; [25]). Indeed, in most of the cases, the definition given depends on the context and the perspective advocated [7]. For some scholars, competency refers mostly to individual characteristics, behaviors and actions (e.g. [17]; [28]) while for others it includes team, process, and organizational capabilities (e.g. [1]) [19]. Furthermore, in many studies (e.g. [28]; [6]) competencies are defined as the sum of motives, traits, self-concepts, knowledge, skills, and behaviors identified through the comparison between average and superior performance or effective and ineffective performance in an organizational context [19]. However, applying this definition appears as a limitation to the broader understanding of competencies in a context where business is changing fast [24], as in modern organizations. Indeed, focusing on behaviors that have already occurred, provide information about the present or

the past [10] with the risk that the identified competencies do not match the future needs of the organization.

Furthermore, previous research shows how competencies are defined from different perspectives [2]. Most of the studies define competency from the individual perspective, considering the individual job as the principal unit of analysis (e.g. [28]; [15]; [13]). Nevertheless, changes in the business environment and in the organization of work (project orientation, teamwork…) imply a change of perspective, including the team and organizational level in the definition of competencies [1]; [14].

Organizational competencies or organizational core competencies are defined in the literature as the product of individual KSAs shared across employees within an organization [4]. Following this definition, individual KSAs, aggregated to the level of the organization, constitute a potential to sustain competitiveness and competitive advantage [30]. Therefore, in contexts characterized by change, it becomes important for organizations to define the core competencies required to support the strategy and the target of the firm and align them with the individual KSAs in the organization [1].

Hence, competency models help organizations in identifying organization-specific competencies and in the alignment of individual competencies with organizational competencies and strategic targets [21]. In the following paragraph, we describe what are the characteristics that competency models should have to facilitate the translation of the organizational strategy into individual KSAs and how they should be implemented to identify KSAs needed to work effectively in changing organizations.

3 Competency based models

Competency models can be defined as tools for the identification of KSAs needed to perform in a specific role; their implementation helps the business to meet the strategic objectives [15]. Nevertheless, Kaplan and Norton [12] point out as the translation of the business strategy into individual KSAs represents a challenge for organizations. This occurs because in most of the cases competencies are defined in a prescriptive way, merely as job descriptions rather than as predictors of future needs [27]. This approach to competencies definition limits the dynamic adaptation of the organization to the business strategy, especially in an environment characterized by change [30]. Indeed, new challenges, changes in products or services, changes in customer preferences have an impact on competency models making them quickly obsolete [21]. Moreover, competency

models should be designed to support the strategic orientation of the company, where organizational core competencies represent the foundation of the strategy formulation process [5]. In light of these considerations, competency models should be developed to be interactive and adaptable to the organizational change and strategy [30]. In this situation, organizational learning becomes the key element for the company to ensure the dynamism of the process [5]. Analyzing competency models in light of organizational learning implies a shift of focus from the individual level to organizational level, including in the competency definition not only individual KSAs but also process competencies that combined with individual KSAs will bring positive organizational advantage [1] accelerating also individual, team, and organizational change [29].

In this study we propose a competency model based on the identification of strategic targets the company is going to achieve, challenging the single-job approach that implies identifying KSAs to better perform in a specific task [16]. Indeed, we consider the organization as a whole and we attempt to define some strategic competencies that will influence the achievement of organizational targets in the future. The core element of our analysis is considering together organizational strategic objectives and employees' characteristics in terms of KSAs deploying them through the support of some key actors within the organization. Indeed, despite is not possible to forecast with certainty future needs, executives and top managers can give some specific insights about new developments, business changes and needs [18]. Involving them in the competencies definition is crucial for the reliability of the results [3]. Another crucial element coming from the literature is the definition of the temporal horizon for the competencies identification. The perspective we adopted is a time frame of 5-10 Years [8]. Our analysis consists of a bottom-up approach [19], we started from the definition of business targets to the identification of organizational core competencies, concluding with the identification of individual KSAs categorized in generic competencies, job-specific competencies, and managerial competencies.

Training and development professionals are using competency models to clarify organisation-specific competencies to improve human performance and unify individual capabilities with organisational core competencies.

4 Method

Data have been collected in one case company with the aim of identifying competencies that will be needed in the future to work in an effective way in the organization.

The methodology implemented consists of a qualitative analysis. Data have been collected through interviews. The duration of each interview was 30 minutes on average. 34 people have been interviewed in 4 different departments and all of them are covering high managerial positions (Directors, Presidents, General Managers).

Data have been elaborated and analyzed following the criteria proposed by Smith [26]. The first step has been developing broad descriptions out of the data collected through interviews. The second step was identifying the main focus areas that have been categorized into four groups and that in our case correspond to the business targets and strategic orientation of the company in the next 5-10 Years. The following step was identifying common patterns and connections within the thematic areas. Specifically, we identified within the four main groups the related organizational core competencies from which we deployed the individual KSAs. The last step has been corroborating evidence clustering individual KSAs in generic competencies, technical competencies, and managerial competencies. The results have been discussed with experts within the organization in different sessions to counterproof their robustness and improve their reliability.

5 Results

The results obtained through the analysis consist of a detailed picture of the future orientation of the organization, starting from the business targets to the individual KSAs needed to achieve those targets. Fig1 describes the process of implementation of the competency model and the main elements emerged from the competency model implementation. Specifically, the four strategic targets identified are:

- Digitalization: what came out from the interviews is that the digitalization process is not only about technology (a basic understanding of technology will still be needed) but is more related to find new agile ways to adapt technology to the business needs, in order to create new business models and to make operations more efficient. From the technical standpoint, the digital transformation will affect the competencies in the engineering sector, indeed the challenge will be combining mechanical and electrical engineering with the digital transformation. Most of the respondents think that one of the priorities of the digitalization process is related to the development of a mindset that enables the digital transformation.

- Energy field: a key factor in the energy field in the next years will be the combination of different sorts of energy through big infrastructure projects (e.g. solar and power plants). The company will need to have a deep understanding of the energy process and market, and of the different players in the energy sector, in order to commercialize energy projects and develop the sector finding innovations. Furthermore, the focus will be on the energy storage and gas transportation as well as knowledge related to the environment and emissions.

- Production and services: in the future, there will be an increased need in terms of services related to the products as updating and upgrading products during their life cycle. To enable this long-term support the company will need to have a good product and system understanding. Another crucial aspect is the modularization of the products. In the future, there will be needed competencies related to modularization in order to create products in line with the customer needs, giving a broader choice to the client and increasing the efficiency of the production.

- Business and technology: there will be the need of developing both business understanding and technical capabilities. Indeed, to increase operational efficiency, the company will need to combine business and engineering competencies, developing business mindset in technical people - in order to use and adapt technology to create new business - and providing technical knowledge to business and salespeople, in order to better understand the products and solutions of the company. Moreover, a strategic mindset is required in all business functions, in particular in terms of understanding how to enter new businesses, and ability to make market analysis.

On the basis of these four strategic elements deployed in organizational core competencies we identified the main characteristics that the “employee and the manager of tomorrow” should have to work in the company.

In the next years, there will be required professionals with different characteristics. On one hand, there will be the need of technical professionals in the area of expertize, possessing according to their job: digital knowledge, computer and computing knowledge, electric and electronic knowledge, automation knowledge, or energy-related knowledge. On the other hand, there will be the need of more adaptable and communicational people, able to create new business occasions, bring innovation into the organization.

What emerged from the analysis of the interviews is that general competencies are considered crucial within the organization. Communication among people and team members is considered a key element to maintain a good working climate, some people are better communicators by nature but all people should learn how to communicate in an efficient way. Furthermore, employees need to be prepared to work in a global network as well as in a virtual environment. Therefore, they need to develop good social skills and social skills in a virtual environment that imply different ways of managing the communication as well as the awareness and understanding of the multicultural context in which the communication takes place.

The work dimension nowadays is the team, therefore the "employee of tomorrow" needs to be a good team player: discussing openly, sharing, information and proposing solutions, developing good and effective reporting skills. The good team player is the one able to work independently, sharing information with the team when needed, and willing to develop him/her self and the colleagues. Furthermore, for the first time in history there will be four different generations simultaneously in the work environment, with their characteristics, background and way of operating. Therefore the "employee of tomorrow" needs to be able to adapt and understand other people characteristics and needs.

Moreover, employees will need to be able to manage their own work, meeting deadlines, prioritizing things while respecting a good quality level. They will need to be meticulous in searching for the right information and ready to exchange information within the company among different departments. The ability to sell their own added value within the team and in the organization is well regarded, as well as the ability to work as part of a system with analytic mindset and understanding the whole logic. Innovativeness is one of the main requirements of the company, together with the ability of analyzing situations optimistically but with a critical eye, conducting analysis at different levels.

Regarding the "manager of tomorrow", we classified the characteristics he/she should have in three main areas. The first area has been defined leadership skills. Indeed, the "manager of tomorrow" will not only be an expert in his/her field but he/she will have the ability to coach and lead the team, promoting a good working climate, focusing on people's needs, helping them to grow. He/she will coordinate the group giving autonomy and responsibility to people, not controlling them. Moreover the "manager of tomorrow" will be able to connect different competencies, seeing the entire picture and combining factors. He/she should be able to support problem solving and involve the team members in decision-making.

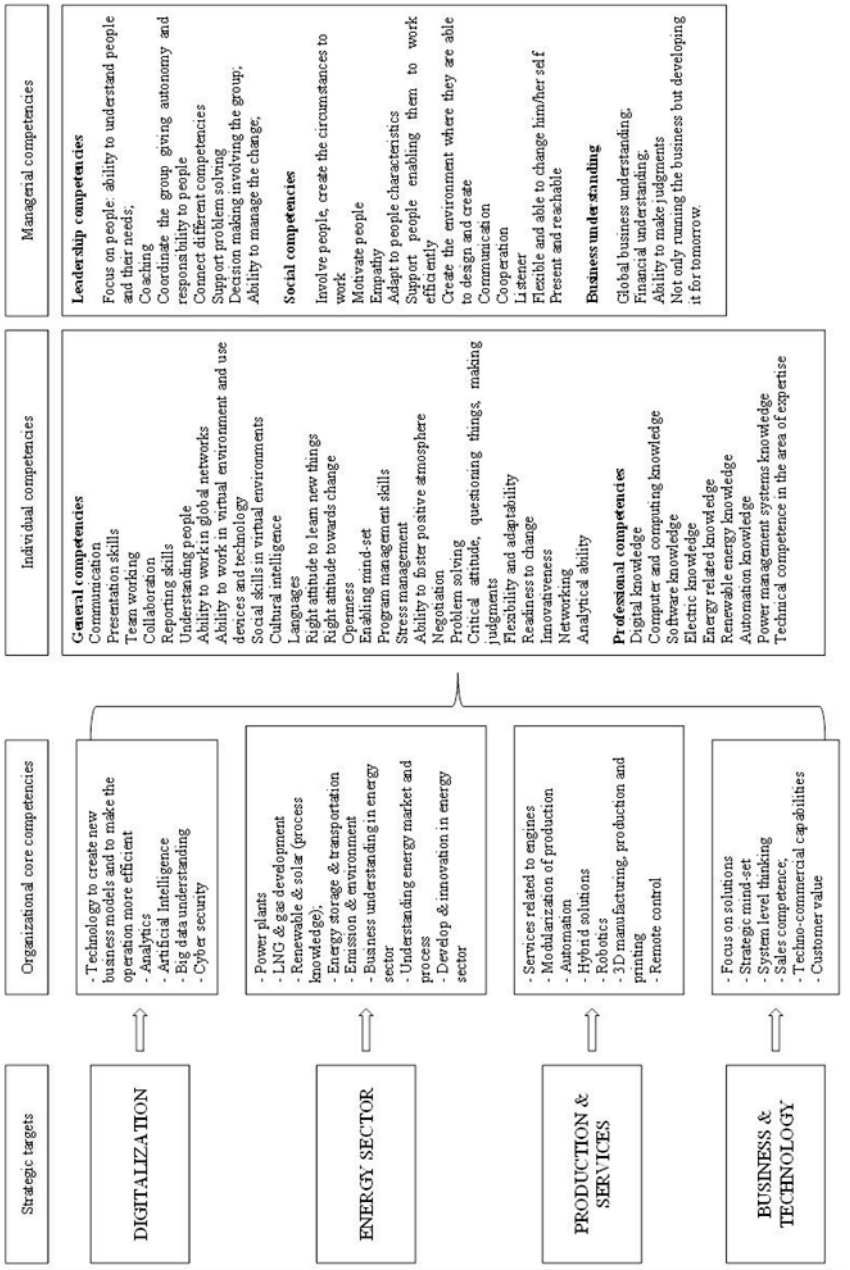

Fig1: Implementation of the competency model and main output

The second area of competencies we identified regards social skills. The "manager of tomorrow" will be able to involve people, creating the right circumstances to work and motivating them. Being emphatic and considering people as individuals, adapting his/her style to the people characteristics, will be crucial to enable the employees to work in a good environment and to achieve results. Therefore, the manager should also have good communication skills, adopting new ways of communicating and sharing information, and the ability to listen to people and understand their needs.

Finally, the third area identified is defined as business competencies. Indeed, the "manager of tomorrow" must have a strong global business understanding and financial understanding, and the ability of combining factors and making judgments. Not only coordinating the business in the present but developing it for the future.

6 Conclusion

The change in business needs implies a change of perspective also in the approach to the human factor within organizations. Managers and executives have to consider that the new characteristics of business require the re-alignment of organizational and individual competencies [30]. Employees need to be not exclusively highly skilled but adaptable and ready to change, able to learn quickly and communicate effectively [20]. In this scenario, the implementation of competency models facilitates the identification of a set of competencies on the basis of the business strategy. Therefore, in this chapter we pointed out how through the implementation of a competency model tailored on the case organization, it is possible to identify the main characteristics the "employee of tomorrow" and on the "manager of tomorrow" should have on the basis of the future strategic orientation and targets of the company. Moreover, the results obtained through this research can be read through the concept of learning organization. Indeed, an organization able to adapt to new requirements, improving its ability to develop new competencies and support individuals and teams in achieving results is considered a learning organization [23].

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Training culture

A new conceptualization to capture values and meanings of training in organizations

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Abstract

Purpose – The purpose of this study is to introduce and validate the concept of training culture defined as a subset of the main organizational culture that allows examining meanings and values attributed to the training within an organization by management and employees.

Design/methodology/approach – This study, following the deductive scale development process, examines the theoretical foundation and psychometric properties of the training culture scale (TCS), testing the utility and appropriateness of the measure. The TCS has been designed and developed on three specific dimensions: individual, group and organizational. A confirmatory factorial analysis has been performed to assess the internal structure.

Findings – Results confirm the three dimensions initially hypothesized: individual, group and organizational, with good reliability indexes on the three factors.

Practical implications – The implementation of the TCS allows training experts to have a broader understanding of training in the organization and to better tailor the training activities according to the training culture profile of the organization.

Originality/value – Cultural analyses are usually carried out from the managerial perspective. The TCS considers the individual perception, including both management and employees in the definition of a training culture profile that enables the organization to develop more effective strategies for training and development.

Keywords Training, Organizational culture, Construct validity, Measurement development, Training culture

Paper type Research paper

Introduction

The recent literature in organizational studies is mainly oriented toward the analysis of informal learning and learning opportunities in daily work (Marsick and Watkins, 2001; Salas and Cannon-Bowers, 2001), with specific focus on topics such as organizational learning, organizational

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learning culture and work-related informal learning (Froehlich *et al.*, 2017; Cortini, 2016; Marsick and Watkins, 2003; Noe *et al.*, 2013; Rebelo and Gomes, 2011). Nevertheless, training still represents a process of strategic importance, to foster individual and organizational learning (Antonacopoulou, 1999; Martocchio and Baldwin, 1997), as well as one of the most important leverage to enhance human resource practices (Berk and Kaše, 2010) with a significant influence on developing and maintaining individual and organizational capabilities (Valle *et al.*, 2000).

Over the years, training has changed and broadened its objectives and characteristics to adapt to the change of organizations, work environment and the needs of individuals (Bartlett, 2001; Huerta *et al.*, 2006; Kraiger, 2014), representing not only a way to enhance individual capabilities but also a strategic tool to govern team processes and organizational outcomes (Bell *et al.*, 2017). Despite in the past, training researchers failed in taking into consideration the contextual factors related to training, today, training is considered as a system enclosed in an organizational context (Salas and Cannon-Bowers, 2001), able to influence the capacity of an organization to assimilate new knowledge in routines and processes (Berk and Kaše, 2010). This capacity to absorb new knowledge is strictly related to the main features of organizational culture and the process of change within an organization (Valle, 1999). Organizational culture and training are, indeed, associated: the main features of the organizational culture produce a visible impact on the development and implementation of training programs and, vice versa, training programs affect organizational culture (Kissack and Callahan, 2010).

In this regard, there is a consistent amount of research on both organizational culture and training, with a lack of dialogue between the two (Kissack and Callahan, 2010). From the training side, topics such as training and development, on the job training, training design and delivery styles, transfer of training, are some of the most analyzed aspects in organizational studies (Bunch, 2007; Khan *et al.*, 2011). However, little attention has been paid to the reciprocal influence between organizational culture and organizational training (Hassi and Storti, 2011). In other words, training is usually considered as a human resource management practice subject to the influence of a specific organizational culture (Ballesteros-Rodríguez *et al.*, 2012; Kusluvan *et al.*, 2010), utilized to meet specific organizational and institutional interests, without taking into consideration the reciprocity between training and organizational culture (Kissack and Callahan, 2010). This paper aims to extend the previous literature analyzing the relationship between organizational culture and training, considering training as a subset of the main organizational culture, to provide a framework capable of examining meanings and values attributed to the training within an organization at individual, team and organizational level. Further, in most of the studies, training is approached from the organizational perspective, while the recipients of training are marginally considered in the analysis, despite they play a crucial role in the relationship between training and culture (Antonacopoulou, 1999; Kissack and Callahan, 2010). In this study, we approach the analysis from the individual perception about training within the organization, to define a training culture profile that enables the organization to develop more cohesive and effective strategies for training and development. Therefore, the aim of this paper is twofold:

(1) to define the training culture construct as a subset of the main organizational culture that includes set of norms of conduct, work attitudes, values and assumptions about training within an organization; and

(2) to introduce the training culture construct and present validity evidence for the measure, examining the theoretical foundation and psychometric properties of the scale, to test the utility of the measure.

The study is conducted through a quantitative analysis using a 23-items scale based on the individual perception of the respondent about the topic. Top management, middle

management and employees were asked to describe training in their organization at three different levels: individual (what is training for me), team (what is training for my team) and organizational (what is training for my organization).

Literature review

In the literature, there are several constructs regarding learning and training within organizations, such as learning culture, organizational learning, training climate and transfer climate (Holton *et al.*, 1997; Marsick and Watkins, 2003; Tracey and Tews, 2005; Yang *et al.*, 2004). The most relevant ones for our study are learning culture and training climate. The former is described as a specific type of organizational culture, oriented toward the promotion and facilitation, sharing and dissemination of workers' learning (Marsick and Watkins, 2003), contributing to organizational development and performance (Rebelo and Gomes, 2011; Cortini *et al.*, 2016). This conceptualization refers mostly to the informal learning at workplace and does not represent a specific subset of the organizational culture, but an orientation of the organizational culture itself (Škerlavaj *et al.*, 2010). Training climate, on the other hand, concerns the "work-related factors that may influence training success and failure. It is instrumental in preparing individuals for formal development activities and achieving desired learning objectives" (Tracey and Tews, 2005; p. 354). Training climate may also have an impact on formal and informal training activities (Tracey and Tews, 2005). Nevertheless, the lack of conceptualization regarding durable and stable features of training within an organization, reflecting values, norms and assumptions, requires more research, especially oriented toward building new constructs (Song *et al.*, 2009). As a consequence, in this paper, we introduce the concept of training culture. Training culture has its origins in the merging of two salient concepts in the study of organizations: training and organizational culture.

In the literature, training is commonly defined as a planned activity, implemented to promote employees' learning of competencies in terms of knowledge, skills and attitudes useful for their job/future job (Noe, 1986; Schmidt, 2007). Moreover, from the organizational perspective, training is instrumental in fitting organizational needs, and it is developed on the basis of values, beliefs and practices, commonly adopted within the organization (Huerta *et al.*, 2006). Additionally, with the transition to a more collaborative way of working, training became not only a means to develop employees' core competencies, but also a way to enable them to negotiate meanings in the workplace (Kraiger, 2014). Training does not have a standard way to be managed and implemented, but it is related to the needs and features of the specific organizational context and the characteristics of the organizational population (Martínez Lucio and Stuart, 2003). Furthermore, training does not take place in a vacuum, but it is contextualized in a specific organization with specific characteristics (Bunch, 2007). Therefore, it is possible to highlight that the concept of training is strictly related to the concept of organizational culture.

Culture represents the personality of an organization (Cartwright and Cooper, 1993). In the past 20 years, the concept has been widely examined by scholars and practitioners (Ashkanasy *et al.*, 2000; Hofstede, 1998; Schultz, 1995), and what is extensively shared in the field is that culture is an attribute of a specific group or organization (Schein, 1985), and it refers to different elements such as ideas, shared meanings, values, rules, habits and symbols that people hold in common (Lewis and Thornhill, 1994). These factors both influence and shape the meaning and values shared within the organization, and the ways to behave and react to specific circumstances (Zammuto and O'Connor, 1992). In fact, as stated by Schein (1985), there are several factors that may condition the meaning and values of individuals and groups within the organization and these features are visible in the way people respond to specific situations. In other words, culture defines the way things are done

in a specific context, the way leaders establish their strategic objectives, and in turn the practices to achieve them (Ballesteros-Rodríguez *et al.*, 2012).

After providing a brief excursus of the constructs present in the literature, and defining the concepts of training and organizational culture, in the following paragraph we attempt to give a first definition of the concept of training culture.

Training culture

In light of the previous considerations, we define training culture as a set of meanings and values attributed to training in a specific organization. In this regard, training culture refers mostly to the formal learning that is planned and dispensed in a specific context and focuses on stable and durable features and meanings of training. Such specific and sectorial features constitute a subset of the organizational culture, formed by employees' and management perceptions about meanings and values attributed to the training in the work environment at an individual, team and organizational level. In this definition, following Hofstede's (1998) perspective, we adopted the individual approach, in which culture is considered as an attribute of an organization manifested and measured toward individuals aggregated to the level of the organizational unit. In turn, this construct aims to understand how training is perceived within the organization and how much the perspectives of different members of the organization are similar, to determine the strength of a culture (Schulz, 2001). Moreover, the decision of including management and employees in the training culture definition is because cultural analyses in the managerial literature are usually carried out exclusively from the managerial perspective, while culture is located in the mental programs of all the members of the organization (Hofstede, 1998).

Considering the three dimensions proposed by Marsick and Watkins in the dimension of the Learning Organization Questionnaire (DLOQ), training culture is also deployed on three different levels: individual, team and organizational. As stated by Aguinis and Kraiger (2009), the benefits of training are detectable at different levels, and these levels are stratified and interconnected. Indeed, training fosters the individual performance, allows employees and management to update their knowledge and skills, it supports problem-solving within the organization, and it helps new employees to orient themselves into the organizational context (Dolan *et al.*, 1999). Training culture at individual level concerns all those aspects related to the benefits of training for the individual, for example, the usefulness of training for maintaining the job, acquiring new knowledge, increasing the chance of being promoted and achieving career success (Noe, 1986; Tziner *et al.*, 2007). Subsequently, the team dimension represents a cornerstone in modern organizations, individuals, aggregated to the level of team share meanings, mental models and understanding, crucial for the coordination of the team itself (Cannon-Bowers and Salas, 1998). Following this reasoning, training culture has also a team dimension that refers to the meaning of training for the team, specifically in terms of impact on work processes, quality of the service, customization and inefficiencies related to the training.

Finally, the organizational level of training culture is based on a variety of topics that are related to organizational values (Williams, 2002), business ethics (Craft, 2010), and targets and goals that the organization is going to achieve. The employees' perception of training at the organizational level can be indirect, not directly affecting them and their career (Kim *et al.*, 2015). In other words, this third level refers to the strategic role of training within the organization. Nevertheless, training is not always planned and aimed to impact on all these dimensions.

In conclusion, understanding training culture is important to shed light on the role that training plays within the organization in cultural terms: meaning, values, practice, attitudes

and behaviors. Regarding meanings and values, Kontoghiorghes (2004) asserts that when the culture of an organization is oriented toward employees' growth and development, trainees perceive their training efforts as valuable for the organization. Contrarily, cultures where training is considered an investment without return can have a negative impact on trainees' perception (Nikandrou *et al.*, 2009). Moreover, the construct allows also to better understand the real essence of some organizational practices. For example, as Bunch (2007) suggests, training facilities or investments in training can be used to provide training of no value to the organization or the employees. This occurs because the organization uses training as an artifact without really believing in its importance. Finally, the comparison between management and employees perception can bring out a discrepancy about training culture; it can happen that the culture does not really embrace the training, despite managers believing in the opposite and vice versa (Ballesteros-Rodríguez *et al.*, 2012). In light of these considerations, in the following paragraph, we illustrate the main features of the scale implemented to measure the training culture construct.

Construct validity

Methodology

The training culture scale (TCS) was created through a deductive scale development process, following the guidelines for scale development from Slavec and Drnovsek (2012). Although their guidelines are contextualized in entrepreneurship research, they are aligned to the basic principles for new measures' development present in the literature (Bagozzi and Edwards, 1998; Carmines and Zeller, 1979; Churchill, 1979; DeVellis, 2003; Hinkin, 1998; Netemeyer *et al.*, 2003). At first, we conducted an in-depth interdisciplinary literature review on training and organizational culture, both from the theoretical and methodological standpoint. Further, we discussed the findings with experts and practitioners, also involving the staff of the organization where we conducted the preliminary study[1], to verify the need for the new measure and provide a content domain specification (Cervai and Polo, 2015). On the basis of the results of the literature review and discussion with experts, we developed a pool of items following the criteria of clearness, simplicity and shortness. Twenty-six items were initially developed and categorized into three dimensions: individual (8 items), team (9 items) and organization (9 items). The scale was pre-tested in a small sample of 25 people operating in healthcare sector and discussed with experts in the field, to verify the understandability and appropriateness of the items. Further, we provided a content validity evaluation to verify the degree to which the items of our scale are relevant and representative of the training culture construct (Haynes *et al.*, 1995).

The sample for this study consists of 360 cases in six organizations operating in healthcare sector, nine in managerial positions and 351 employees. Participation was voluntary and anonymous; 67 per cent were female, and the number of hours spent in training in one year was 75.6 in average.

Response choice alternatives are ranged on a scale from 0 (not at all) to 100 (completely). Respondents select the items they consider relevant to describe what training means in their organization, and they provide a score from 0 to 100 to each one, to define the importance of each item for them. The questionnaire was administered online, and the level of agreement is expressed through a numerical value determined by moving a slide-bar of a visual scale.

Considering that the TCS has been designed and developed on three specific dimensions: individual, group and organizational [following Marsick and Watkins (2003), DLOQ], a confirmatory factorial analysis (CFA) has been performed to assess the internal structure, to verify if the three dimensions initially hypothesized are consistent.

The validation process has been performed through a latent variable model (LVM); specifically, it has been implemented as a reflective LVM to point out the underlying structure that produced relationships among multiple manifest variables (Beaujean, 2014). Further, reliability and construct validity have been assessed to verify to what extent the scale measures the construct that is expected to measure (Netemeyer *et al.*, 2003).

Results

To analyze the statistical evidence of the construct, as a first step, it has assessed the dimensionality of the construct. The results of the CFA support the three-factors model (Table I): individual level (8 items), team level (7 items) and organizational level (8 items). Three items (useless, waste of time and waste of money) were not significant (coefficient > 0.40), and they have been discarded from the scale (Table I).

As a second step, it has assessed the reliability of the questionnaire. The most common method for the measurement of the reliability is the internal consistency, assessed through Cronbach's coefficient alpha (Cronbach, 1951). The overall reliability, tested on the entire set of items, is 0.94. Subsequently, we also calculated the reliability of each dimension,

Dimension	Latent variables	Estimate	Standard error	$p(>\|z\|)$
Individual	An individual opportunity to acquire new competences	1.000		0.000
	An individual opportunity to improve in my job	1.079	0.054	0.000
	An opportunity to transfer what I learnt from my colleagues	1.016	0.052	0.000
	An opportunity to reflect on my own work dimension	0.992	0.057	0.000
	Useful for my career development	0.896	0.068	0.000
	Corresponding to individual training requests/ needs	1.028	0.063	0.000
	An individual duty	0.851	0.067	0.000
	An individual choice	0.885	0.067	0.000
Team	An opportunity to improve team work processes	1.000		0.000
	An opportunity to offer a better service	0.961	0.043	0.000
	An opportunity to improve also for colleagues	1.024	0.044	0.000
	Customized for teams' needs	0.995	0.046	0.000
	Shared with the team	0.918	0.049	0.000
	Higher risk of inefficiencies when people are in training	−0.308	0.055	0.000
	More workload for colleagues	−0.313	0.058	0.000
	Useless	−0.004	0.043	*0.931*
	A waste of time	0.063	0.038	*0.097*
Organization	A strategy to improve the whole organization	1.000		0.000
	A strategy for excellence in the organization	1.059	0.048	0.000
	A strategy for organizational learning	1.045	0.046	0.000
	A strategy to value human resources	1.010	0.050	0.000
	Shared with all employees	1.003	0.051	0.000
	A long-term plan	0.990	0.053	0.000
	Based on an appropriate needs' analysis	1.016	0.053	0.000
	A normative requirement	0.585	0.067	0.000
	A waste of money	−0.016	0.042	*0.700*

Note: The items in italics are the ones with coefficient > 0.40

Table I. Results of the confirmatory factor analysis (CFA)

obtaining 0.88 for the individual level, 0.73 for the team level and 0.92 for the organizational level, and all values are > 0.70 (Hair *et al.*, 1998).

As a third step, we calculated the mean inter-item correlation (MIC) and its average variance extracted (AVE) to assess the construct validity. The MIC of the TCS is 0.42, which is coherent with the suggestions coming from the literature (Piedmont, 2014). The AVE is 0.55 that can be considered adequate following Slavec and Drnovsek (2012).

Discussion and implications

Through this study, we tested the factors underpinning the training culture construct, confirming its multidimensionality and validity. Indeed, the three factors structure emerged through the analysis supports the initial hypotheses of the researchers. The results show also internal consistency and construct reliability. Nevertheless, further research could explore and confirm reliability through the test-retest.

This study represents a first attempt to develop an instrument for the measurement of the training culture of an organization, recognizing its important role in defining how training is perceived and conceived within an organization by management and employees. The research has implications for both theory and practice. From the theoretical standpoint, we aim to provide evidence to fill the gap in research regarding the mutual relationship between organizational culture and training through the introduction of a solid construct for the understanding of training culture within the organizations. This research contributes to the literature by developing a first conceptual definition of training culture, bringing evidence of its validity and in turn providing a scale for its measurement. From the organizational perspective, developing measures is crucial for diagnostic purposes (Tracey and Tews, 2005), and defining the training culture of an organization is important, because it allows the organization to get a feedback about the meaning and values attributed to the training within the organization. The implementation of the TCS brings relevant information and insights regarding how training is perceived within the organization by management and employees, pointing out possible gaps and improvement areas, when data highlight a strong difference between employees and managerial perception.

Moreover, the calculation of a dispersion index gives the opportunity to determine the strength of a culture, where a larger dispersion suggests that meanings and values attributed to the training within the organization are less shared among employees. Awareness about cultural dimensions allows trainers and training experts to better tailor the training activities according to the training culture profile of the organization (Kissack and Callahan, 2010). The figures below (Figures 1, 2 and 3) illustrate possible outputs obtainable through the implementation of the TCS. In this paper, we discuss two organizations among the six involved in the study to give an overview of the scale application. Organization 1 and Organization 2 have been selected, because they show different training culture profiles on each dimension (individual, team and organization) and some interesting differences between leadership and employees perception. Figure 1 shows how the meanings attributed to training at an individual level are different comparing employees and leadership. Indeed, in Organization 1 employees attribute higher scores to most of the items, while in Organization 2 is the leadership that assigns higher scores to most of the items. Moreover, through the figures, it is possible to have some information about the training culture in the specific organization. Indeed in Figure 1, the leadership of Organization 2 attributes lower scores compared with the employees to the item "individual choice" stating that training is not only a choice in the organization, but is also a compulsory aspect of the individual working activity. Concerning the group dimension (Figure 2), the pattern of the two organizations is similar to the previous one. In Organization 1, employees

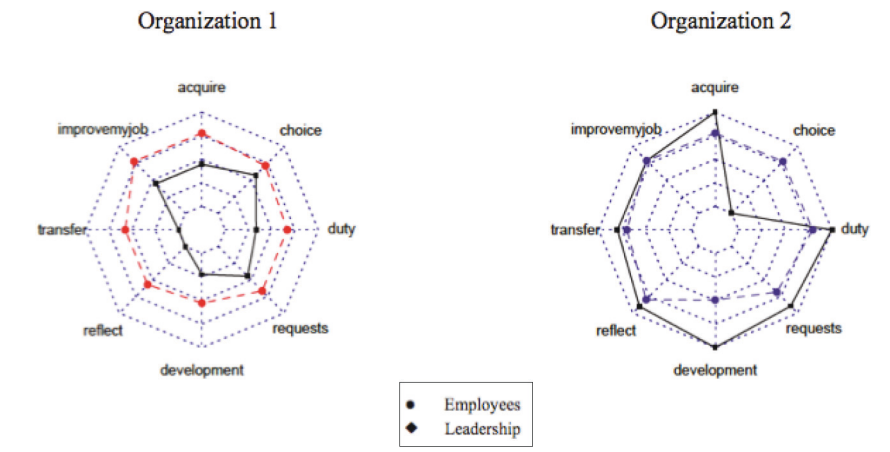

Figure 1.
Individual level

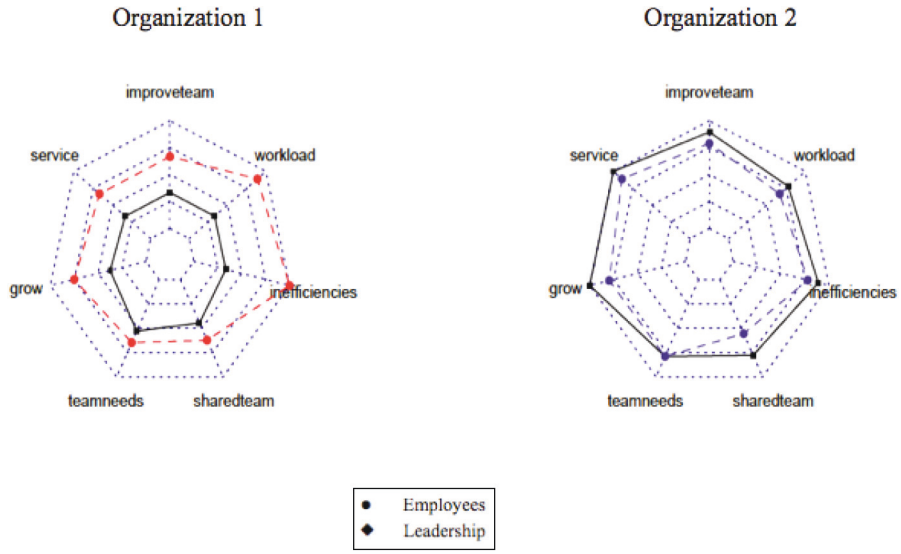

Figure 2.
Team level

are attributing higher scores to all the items with a considerable distance from the leadership point of view, while in Organization 2, the perception of leadership and employees is very similar. At an organizational level (Figure 3), leadership and employees' perception about training is very similar in both organizations. Performing this kind of analysis through the TCS implementation allows scholars and practitioners to gather information on how training is perceived within an organization, and what are the different points of view of the members of the organization, to identify areas of improvement.

The illustrative analysis presented in this paragraph shows the results of data analyzed at an aggregate level, but it is important to acknowledge that even different groups within the same organization can have different cultures or subcultures (Lewis and Thornhill, 1994).

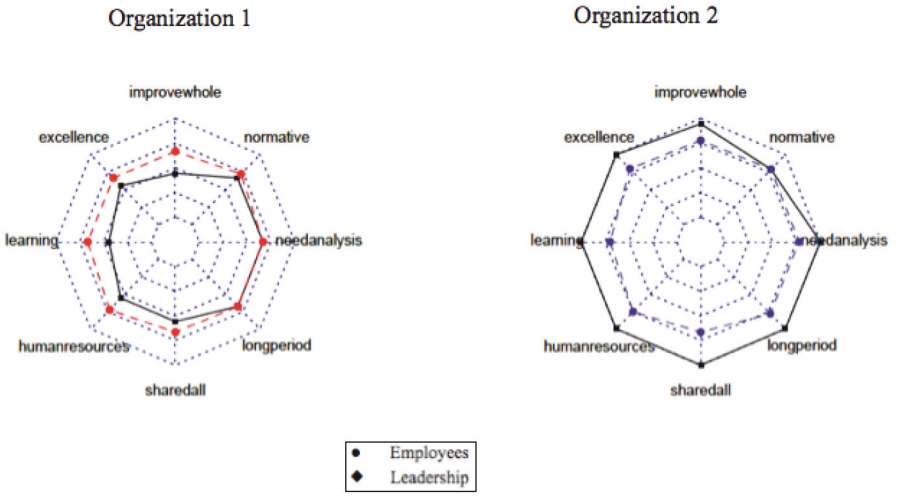

Figure 3.
Organizational level

Through the comparison of training culture in different departments, as well as among different professional categories, it is possible to highlight the presence of specific training subcultures. Based on the training culture assessment, the organization can identify peculiar subculture and better tailor training programs on the basis of their characteristics. Further research is required to shed light on the impact of subcultures on the main training culture.

Furthermore, it is reasonable to inquire, as Rebelo and Gomes (2011) expected with regard to organizational learning culture, that employees' characteristics, tenure in the organization, age and level of education can have an influence on the individual perception about training culture. For this reason, future research should address this issue, and the implementation of the TCS could facilitate this task.

Moreover, it is important to consider that the nature of the business environment significantly differs from sector to sector (Smith and Dowling, 2001), and for this reason the TCS needs to be implemented in different type of organizations and organizational settings. Further studies are needed to cross-validate the TCS in different sectors.

Note

1. The first version of the TCS has been developed and tested in the European project expero4care LLP project 2013-1-IT1-LEO05-03975, coherently with the expero4care standard.

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The Role of Training in Organizations: a Comparative Case Study of Employees and Management Perspectives

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Abstract

The transition to a more collaborative way of working brought a change in the role played by training in organizations, representing not exclusively a way to develop employees' core competencies but also a strategic tool to govern team processes and organizational outcomes. As a consequence, training became a system embedded in the organizational context, developed on the basis of values, beliefs and practices commonly adopted within the organization. In this regard, the literature still lacks an in depth analysis of how training is perceived in the organization and how the perspectives of different members vary. Therefore, this article aims to fill this gap comparing and analyzing the meanings and values attributed to the training by management and employees. The analysis has been carried out through the implementation of the *Training Culture Scale* (TSC) that allows to point out the meanings and values of training at individual, team and organizational level. Employees' characteristics, tenure in the organization, gender and level of education can be predictors of the different perception of training within the organization. The comparison between managers and employees perceptions allows companies to develop strategies to strengthen the *Training Culture* of the organization.

Introduction

The increasing complexity and competitiveness of the business environment require employees to face several organizational challenges and changes (Kim et al., 2015). In this situation, training constitutes a strategic leverage for human resource management (HRM) to maintain, update and increase individual knowledge and skills, as well as it represents a powerful tool to prevent the obsolescence of the human capital at organizational level (Ballesteros-Rodríguez et al., 2012). Furthermore, training has a central role in the development of core organizational competencies, with an impact on the strategy development process and on decision-making within the organization (Cappelli and Crocker-Hefter, 1996). Many factors can influence the training perception in a specific organization, and among the most relevant there are the organizational context and culture, together with the HRM practices implemented in the organization (Ballesteros-Rodríguez et al., 2012). Indeed, utilizing HRM practices oriented to promote training develops values and believes that are strongly connected to the importance of continuous learning and training in the organization (Wei et al., 2008). Therefore, analyzing the *Training Culture* of an organization becomes important in order to have insights regarding meanings and values attributed to the training in a specific context, furthermore the comparison between management and employees helps organizations in pointing out differences and improvement areas (Polo et al., 2018). In this regard, previous research has shown a possible discrepancy in the managerial vision of training at different levels in the organization. Indeed, managers covering strategic positions in the company might acknowledge the relationship between skills development and sustaining competitive advantage, more than other groups in the organization who might favor short-term priorities (Smith and Dowling, 2001). Therefore, research examining managers and subordinates attitudes towards training is still needed, in order to develop long terms perspectives able to have an impact on the strategy development process.

In light of these considerations, the aim of this article is to compare managers' and subordinates' perceptions of *Training Culture.* The study aims to answer the following research questions:

(1) to what extent does managers and subordinates perception of *Training Culture* agree?
(2) what are the factors that influence managers and subordinates perception of *Training Culture?*

In order to answer to the above mentioned research questions, this article is organized as follows: in the next session we review the literature pointing out the research gap, in the third session we describe the methodology used and the data collection process. In the last session we discuss the results of the study and its implications and limitations.

State of the art

Previous literature shows that managers play a crucial role in facilitating subordinates' learning and training (Hasson et al., 2013). Nevertheless, managerial attitudes towards learning, training and, human resource development (HRD) in general, are not always unitary (Smith and Hayton, 1999). As previously mentioned there could be some substantial differences in training's perception between top management - attributing to training a long term strategic value - and junior/middle management – that having a more operational approach might be reluctant in releasing employees for training (Smith and Dowling, 2001). Moreover, in the actual business environment - characterized by revolutionary changes in the workplace and in the nature of work itself - subordinates engagement in learning and training activities becomes crucial to acquire, adapt and differentiate knowledge, skills and abilities according to the new needs (Bezuijen et al., 2010). In this regard it is important to highlight that most of the studies regarding learning and training adopt a managerial perspective, despite to analyze the meanings and values attributed to the training and learning activities in an organization is required the involvement of different stakeholders (Yang et al., 2004). Indeed, the impact of training is detectable at different levels: on the individuals, on the working team, on the organization and, on the society (Aguinis and Kraiger, 2009; Alhejji et al., 2016). In this regard, Kim et al. (2015) categorized training into two types: individual training, where the impact of training is strictly related to the individual performance and organizational training where the training impact is not directly detectable by individuals but it is important for the sustainability on the long run of the organization as a whole. Although research on training has usually addressed individuals as primary unit of analysis (Aguinis and Kraiger, 2009), followed by the organization, there is evidence in the literature of the importance to include also the team level. This dimension refers to the impact that training has on the teamwork process (Cannon-Bowers and Salas, 1998). Analyzing meanings and values attributed to the training at individual, team and organizational level allows organizations to have an overall picture of how training is perceived (Polo et al., 2018).

Nevertheless, research exploring the extent of agreement between managers and subordinates perception about training is still lacking (Hasson et al., 2013). Furthermore, previous research considered some organizational characteristics as factors influencing training (industrial sector, size of the company…) (Acemoglu and Pischke,1999; Black, Noel and Wang 1999; Guidetti and Mazzanti, 2007; Dustman and Schonberg, 2009) while still little research explores employees characteristics, tenure in the organization, age and level of education as predictors of different perceptions about training within the organization (McNamara et al., 2012).

Therefore, in this study we attempt to provide a case analysis about *Training Culture*, comparing

managers and subordinates perception and identifying possible other factors that might influence the training perception.

Methodology and sample

The study was carried out in a Finnish multinational company, through the implementation of the *Training Culture Scale* (TSC) previously validated in healthcare sector (Polo et al., 2018) according to the guidelines for the scale development process (Bagozzi and Edwards, 1998; Carmines and Zeller, 1979; Churchill, 1979; DeVellis, 2003; Hinkin, 1998; Netemeyer et al., 2003; Slavec and Drnovsek, 2012). The items of the questionnaire were developed following the three Dimensions of the Learning Organization Questionnaire (DLOQ) (Marsick and Watkins, 2003): individual, team, and organizational. The TCS allows to gathered data on the perception about *Training Culture* in the organization, through this study we explore the possible implementation of the TCS in corporate sector. The data used in this article have been collected by researchers during the training sessions provided by the company. The scale was tested on the sample trough a principal component analysis followed by a confirmatory factor analysis.

The sample is composed of 417 units: 249 employees and 165 subjects with managerial responsibility. Specifically, there have been surveyed 4 Vice-Presidents, 15 Directors, 19 General Managers, 63 Managers, 17 Line Managers, 11 Supervisors, 21 Team Leaders and 2 Project Managers.

Measures

This study investigates the *Training Culture* perception at three levels: (1) individual, (2) group and (3) organization. We used the 23 items of the TCS. Respondents were asked to indicate on a visual scale from 0 to 100 their level of agreement for each statement.
The results of the principal component analysis suggested the presence of three factors, confirmed by the confirmatory factor analysis (CFA) (see *Table1*).
The preliminary data analysis conducted in this article consisted of the implementation of some t-statistics in R. Further, we performed some regression models to verify how employees and management perception about training might vary and what are the main factors influencing the training perception at different levels.
As first step we verified if there is a statistically significant difference in the *Training Culture* perception between managers and subordinates. As second step we verified if other variables influence the *Training Culture* perception in the organization using some control variables. The control variables utilized in this study are: gender, tenure in the organization, division/unit, seniority in the organization, level of education and number of days spent in training in the previous year.

Results and Discussion

The results of the CFA pointed out that the structure of the TCS implemented in corporate sector is based on three factors. *Table 1* shows that the first factor corresponds to what we refer as organizational dimension, the second factor includes items regarding the individual dimension and the third factor constitutes the team dimension. In this article, we use the three factors of the TCS to understand if there is some difference in the *Training Culture* perception between management and subordinates and what are the main elements that influence the *Training Culture* perception in the case organization.

The results of the analysis performed pointed out that there is no statistically significant difference between management and subordinates perception about *Training Culture* in the second (individual) and third (team) factor but in the first (organizational) factor there is a statistically significant difference between the two groups (p-value 0,053). The first factor includes the items regarding the organizational dimension. Therefore, there is a difference between managers and subordinates in considering training as a strategy to improve the organization, promote organizational learning, value human resources and planned on the long term. Furthermore, to answer to the research question number one we can state that managers and subordinates have a quite homogeneous perception about the role played by training at individual and group level with some differences concerning the organizational level. The literature supports the results highlighting that when the perception of a phenomenon in the organization is shared among the members the culture of the organization can be considered strong. Moreover, the homogeneity of managers and subordinates perception brings more positive outcomes to the organization (Ostroff et al., 2005). In light of these results, we explored what are the factors that might explain a different *Training Culture* perception within the organization. The results of the implementation of the regression model show that the unit the respondents belong to in the organization is one element that influences the *Training Culture* perception. Indeed among the different units analyzed (Operations, Marketing/Sales, Supply, Technology/R&D, Production, HR, Finance/Accounting) people working in production show a statistically significant difference in *Training Culture* perception regarding the first and the third factor (p-value 9,056e-03, 3,073e-6) that correspond to the organizational and team dimension. More specifically, results show that for people working in the unit of production training constitutes a risk of inefficiencies when colleagues are attending the courses, more than in other units.

Following, we analyzed also the main differences in the *Training Culture* perception accordingly to the gender (male-female) and the role of the person in the organization (blue collar-white collar). The results show that concerning the gender there is no statistically significant difference between male and female, while concerning the role, white collars and blue collars show a statistically significant difference in the first (p-value 3,021e-03) and third factor (p-value 4,524e-10) that correspond to the organizational and team level of *Training Culture*.

Regarding the seniority in the company a regression model has been performed and the results show that the difference between the four groups is 0,043. Regarding the three factors of the TCS only the third factor shows a statistically significant difference among the groups (p-value 5,621e-05) (see *Figure1*).

Concerning the educational level two groups have been compared, people having a university degree versus people who do not have a university degree and also in this case there is a statistically significant difference in the third factor (p-value 7,351e-11).

The last test we performed regards the influence that the number of days spent in training during the previous year have on the *Training Culture* perception. The analysis was performed on two groups: people who spent from 0 to 5 days in training and people who spent more than 5 days in training. The results show a statistically significant difference in the first (p-value 0,007) and in the third factor (p-value 0,002).

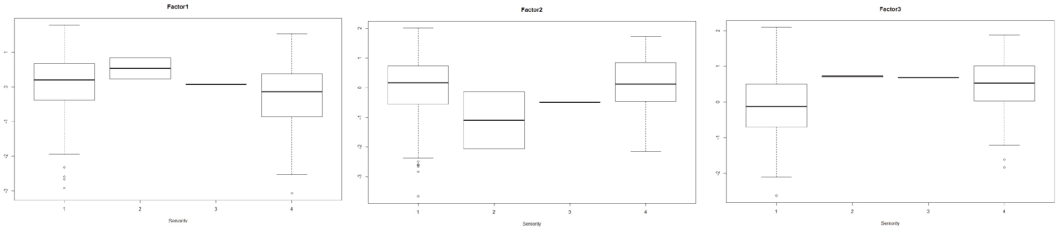

Figure 1 Seniority impact on the *Training Culture* perception (1: 0-5; 2: 6-10; 3: 11-15; 4: 16+).

Latent Variables	**Factor 1**	**Factor 2**	**Factor 3**
An individual opportunity to acquire new competences	0.155	**0.838**	
An individual opportunity to improve in my job	0.211	**0.841**	
An opportunity to transfer what I learnt to my colleagues	0.120	0.337	**0.513**
An opportunity to reflect on my own work dimension	0.157	**0.445**	0.411
Useful for my career development	0.232	**0.519**	0.247
Corresponding to individual training requests/needs	0.287	**0.504**	0.353
An individual duty	0.175	0.363	**0.426**
An individual choice	0.179	**0.433**	0.239
An opportunity to improve team work processes	0.270	0.436	**0.490**
An opportunity to offer a better service	0.403	**0.449**	0.295
An opportunity to improve also for colleagues	0.347	**0.470**	0.445
Customized for teams' needs	0.259	0.369	**0.621**
Shared with the team	0.251	0.307	**0.699**
Higher risk of inefficiencies when people are in training			**0.570**
More workload for colleagues			**0.586**
A strategy to improve the whole organization	**0.896**	0.156	
A strategy for excellence in the organization	**0.942**	0.229	
A strategy for organizational learning	**0.867**	0.236	0.151
A strategy to value human resources	**0.630**	0.222	0.184
Shared with all employees	**0.453**	0.212	0.366
A long term Plan	**0.492**	0.257	0.339
Based on an appropriate needs' analysis	0.285	0.311	**0.355**
A normative requirement	0.185	0.196	**0.515**

Table 1 Results of the CFA conducted on the TCS implemented in corporate sector.

Conclusions and Limitations

Based on the empirical findings of this research we can conclude that the results of the factor analysis conducted on the TCS previously validated in healthcare sector confirm the presence of three factors, with some differences in the items distribution that require further research to test the stability of the scale in corporate sector.

Regarding the research questions we seek to answer with this study we can conclude that managers and subordinates perception of *Training Culture* is similar concerning the meaning and values attributed to training at individual and team level with some differences in the perception of the role played by training at organizational level. This can be due to the different access to

information of the two groups included in the analysis. Indeed, managers might have a higher perception of the strategic role of training in the organization compared to subordinates.

One interesting element arisen is that the meaning and values attributed to the training at individual level (factor 2) are quite homogeneous and shared among the members of the organization.

For what concerns the factors that influence managers and subordinates perception of *Training Culture* we found that gender is not relevant, while the role of the person in the organization (white collar or blue collar), the unit the respondents belong to (production or others), the seniority in the organization, and the level of education are significant in determining the way *Training Culture* is perceived in the organization but do not have an impact on the meanings and values attributed to training at individual level.

Finally, the study has some limitations due to the fact that data have been collected in a single company. Therefore, the same analysis should be conducted in other organizations operating in different sectors, to extend the generalizability of results.

Furthermore, the analysis carried out and the results achieved represent only an exploratory effort to run the dataset that will be improved in the future. Therefore, future research should take into consideration the implementation of more sophisticated models to analyze how employees and management perception of *Training Culture* vary and how this variation can be interpreted.

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The impact of a participatory ergonomics intervention: the value of involvement

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ABSTRACT

This article presents the implementation of a participatory ergonomics (PE) approach in a multinational company in the northern side of Italy, aiming to improve ergonomics, well-being and production outcomes. The methodology used is based on the creation of a multi-disciplinary team to provide and discuss ergonomics' solutions according to the physical problems of the workers involved and better manage the re-introduction of the workers in the line of production. The study consists of a longitudinal analysis before and after the plant redesign and the PE intervention. Some psychosocial variables as job satisfaction, perceived fatigue, perceived usefulness, repetitiveness, occupational safety and company attention to safety have been monitored to verify the impact of the PE intervention. The results show how the PE intervention positively influences the perception of workers regarding the level of fatigue and repetitiveness and increasing job satisfaction, usefulness and occupational safety with a positive impact on productivity.

Relevance to human factors/ergonomics theory

The current research focuses on the analysis of the impact of a participatory ergonomics (PE) intervention through the evaluation of some psychosocial factors as job satisfaction, fatigue, occupational safety, repetitiveness and usefulness.

These indicators have been identified to evaluate the effectiveness of the PE intervention. In the literature, participatory approaches to reduce work-related musculoskeletal disorders have received considerable attention. Nevertheless, there still is a lack in addressing programme delivery and intermediate outcomes to identify facilitators and barriers in PE interventions. The results of this study constitute a first step in this direction.

Introduction

In the broad literature of participatory ergonomics (PE), there is a rising interest towards health risk factors and musculoskeletal work-related disorders (Jensen 1997; Nagamachi 1995; Wilson and Haines 1997), where PE interventions or programmes are used to reduce the impact of these problems (Rivilis et al. 2006). Participatory methods – implemented to improve ergonomic aspects concerning the work, the workplace and the benefits arising from participatory methods – have been discussed in the literature particularly in terms of PE (Kogi 2006). However, the literature highlights PE as a term that includes a broad range of practices rather than a unitary concept. For this reason, it is challenging to find a theoretical framework for practice and compare outcomes of various PE experiences (Haines et al. 2002). Wilson and Haines (1997) describe PE as 'the involvement of people in planning and controlling a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals' (491). Kourinka (1997) defines PE as a 'practical ergonomics with participation of the necessary actors in problem solving' (268). In fact, the focus of PE approaches is on the improvement of the workplace conditions through participation, communication, problem solving and engagement of workers in the process of development and implementation of ergonomics' interventions (Simon and Leik 1999; Rivilis et al. 2008; Gjessing, Schoenborn, and Cohen 1994). Moreover, the involvement of end users in the development of ergonomics interventions is widely considered as a key factor for their success (Hignett 2003), as workers have a detailed understanding of their job and are able to provide useful inputs that lead to build trust and commitment that may impact on job satisfaction and performance (Brown 2002).

Across managerial literature, bottom-up approaches have been considered as essential for the organisational change. These approaches are based on workers' ability to provide a significant contribution to PE interventions and impact its success (Hess et al. 2004; Gyi, Sang and Haslam 2013). Further, PE is an intervention that is designed to engage not only workers but also managers (Tompa, Dolinschi and Natale 2013) to bring about meaningful changes to work

risks by merging workers' knowledge and employers resources (Israel, Schurman and House 1989; Bohr, Evanoff and Wolf 1997; Wilson and Haines 1997; Brown 2005; Hignett, Wilson and Morris 2005; Haukka et al. 2008; Dale et al. 2016). Most of PE studies consider the participation of workers as part of the process. In fact, participation encourages workers to control their work activity, with an impact on work, organisational and psychosocial risk factors (Bongers, Kremer and ter Laak 2002; Rivilis et al. 2008; Cole et al. 2009).

Participatory approaches to reduce work-related musculoskeletal disorders (MSDs) have received considerable attention in the literature (e.g. van Eerd et al. 2010). Through tailored interventions, organisations match employees' readiness to change (Prochaska, Prochaska and Levesque 2001) better than with standard interventions, due to the ability of tailored interventions to significantly reduce MSD symptoms in a wide range of industries (Whysall, Haslam and Haslam 2005; Whysall, Haslam and Haslam 2006a; Whysall, Haslam and Haslam 2006b). The notion of 'Participatory Design' was recently recognised as an approach to secure optimisation of both the economic and ergonomic aspects of work (Vink, Imada and Zink 2008; Broberg 2010). Moreover, in their systematic review of PE studies, Rivilis et al. (2008) underline the role of PE in improving employees' health and productivity, and the need for monitoring the efficacy factors of PE. Traditionally, the focus of PE is on the physical changes of the workers related to MSD. As a consequence, the most monitored indicators in PE approach are risk factors, pain intensity, reducing injuries, reduction in lost days from work or sickness absence (Rivilis et al. 2008), although the growing literature indicates a role for the psychosocial and work organisation factors (Bongers, Kremer, and ter Laak 2002) as indicators of the success of a PE intervention.

Finally, PE studies across industries raise important limitations related to inadequate delivery of the programme due to lack of time, lack of management commitment and work pressures (Carrivick et al. 2005; Haukka et al. 2008; Cole et al. 2009; Driessen et al. 2010; Oude Hengel et al. 2013; Cantley et al. 2014). In this regard, several scholars (Robson et al. 2001; Rivilis et al. 2008; Dale et al. 2016) call for future studies to address programme delivery and intermediate outcomes to identify facilitators and barriers in PE interventions. However, despite its challenges, PE approaches are still favoured to reduce or prevent MSDs in complex environments (Glina et al. 2011; Punnett et al. 2013).

In the light of these considerations, the present study focuses on the psychosocial factors related to the PE intervention, in order to demonstrate their influence on PE efficacy. The aim of this study is to monitor a PE intervention in a production plant of washing machines dedicated to including workers with physical pathology

(MSD) in the line, through the analysis of psychosocial factors before and after the PE intervention.

The present study follows the main objective of the PE approach: to improve workers health and productivity (Rivilis et al. 2008) connecting workers health, well-being and the company productivity needs.

In particular, the hypotheses of the research can be summarised as follows:

A.1. Fatigue and repetitiveness in MSD workers decrease after PE intervention;

A.2. Fatigue and repetitiveness in MSD treated are lower than in control group;

B.1. Organisational Safety (OS) and Company attention to Safety in MSD workers increase after PE intervention;

B.2. OS level and Company attention to Safety in MSD treated are higher than in control group;

C.1. Usefulness and Job satisfaction (JS) in MSD workers increase after PE intervention;

C.2. Usefulness and JS level in MSD treated are higher than in control group;

Participatory ergonomics intervention: the methodology

This study has been carried out at Electrolux (a Swedish multinational household and professional appliances' manufacturer) located on the site of Porcia (Italy), and dedicated to the production of washing machines.

The research started in 2009 simultaneously with the management's decision to formulate a strategy to re-collocate blue collar workers with MSD in line of production, after the plant re-engineering. Indeed, up to 2009, the plant registered an increasing number of blue collar workers with MSDs. Although a link of causality between repetitive tasks and MSD surfaced in rare cases, the status of workers with MSD obliged the company to enrol them in harmless tasks. Until 2009, these workers with MSD were placed out of the line of production to perform simple tasks considered harmless for their problem, generating a very low productivity rate. Accordingly, the presence of an increasing number of workers with MSD among blue collar workers became a serious issue for the management, because it affected considerably the performance of the company and also the

organisational climate. Indeed, employees began to express their concern and disappointment for the different treatment reserved to workers with MSD.

In 2012, PE intervention has been provided to re-collocate workers with MSD in the line of production, according to their physical problems. The model of intervention was called *Accomodation RAL*, to define a detailed procedure of re-integration in line of blue collar workers with MSD, based on the participation of workers, management and experts. *Accomodation RAL* is a PE procedure, based on the worker's active involvement in the decision process to define ergonomics' interventions to improve the workstation, guaranteeing an open and tutelary comparison between the worker and the management, and giving the worker the possibility to choose, among a shortlist of workstations, the most adequate to his/her physical problem. To ensure that the position is suitable for the worker, the procedure foresees the support of video to analyse the expected actions/movements in the workstation and the continuous monitoring of work conditions during the re-introduction. The PE team is composed by: the plant manager, the HR manager, the line manager, medical staff, an ergonomist and the single worker involved in the case discussion, in order to identify the most suitable workstation for each worker with MSD. University researchers were present in order to observe the process. Each worker with MSD was called to join the team and discuss the ergonomic improvement of the position using video media and technical indicators to verify the appropriateness of the new position for his/her physical problem. Each worker had the possibility to discuss his/her own situation within the team for 30–40 minutes, and try the new position for a period before accepting it. The PE team was appointed to improve the position (height-adjustable tables, lift-assisting devices, sit-stand seating, …), following the suggestions of the worker with MSD after testing the new workstation. The PE team works – in multiple sessions (from a minimum of 1 to a maximum of 7) – until the worker with MSD expresses his/her satisfaction about the new workstation.

Therefore, the objective of this research is to analyse the impact of blue collar workers re-integration on a set of psychosocial variables and productivity (Figure 1).

Research design

This study consists of a longitudinal analysis conducted in two phases: 2009 and 2013.

In 2009, before the re-engineering of the line of production and the implementation of the PE procedure, a sample of workers (healthy and with MSD) was interviewed to analyse the current situation in terms of job satisfaction, fatigue, repetitiveness of the job, safety and usefulness.

In 2013, after the re-integration of workers with MSD in the line of production, a new sample of blue collar workers healthy and with MSD, had been interviewed about the same psychosocial factors of the previous phase, their perception regarding the PE procedure and the reintegration in the line of production (Figure 2).

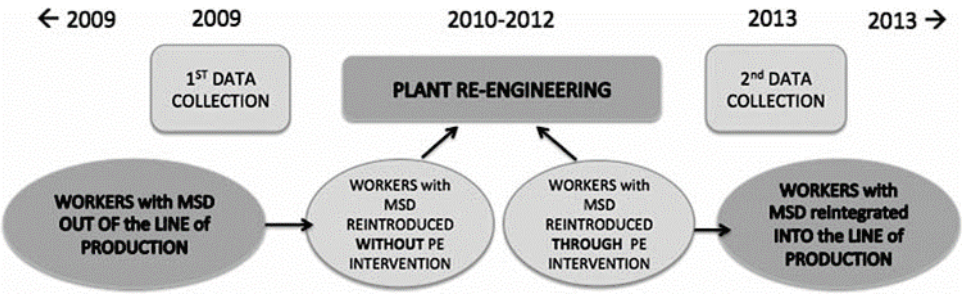

Figure 1. Timeline diagram of the PE intervention

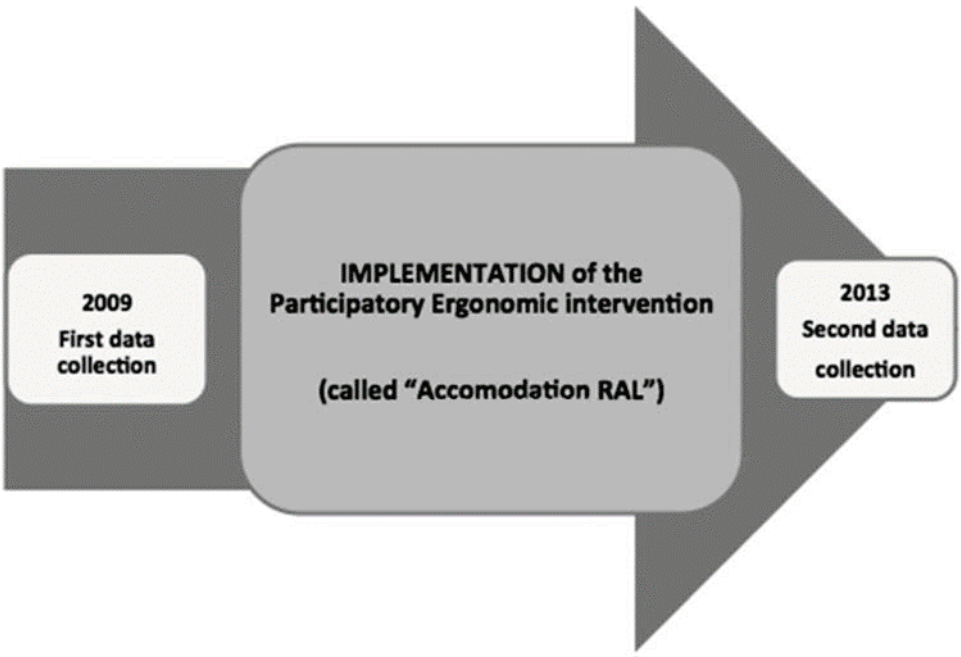

Figure 2. Research design diagram

Table 1. Psychosocial variables monitored before and after the PE intervention.

	Definition	Approach	Quantitative tool	Qualitative tool
Fatigue	It represents one of the most common compliant of blue collars and it is defined as a physical and mental exhaustion that can be due to short-term stressful situations or to a long-continued effort lasting for a period that lasts from weeks to months and includes physical, emotional, behavioural and cognitive components (Tang et al., 2016).	The fatigue has been monitored as the subjective level of fatigue perceived by the single worker.	5-point Likert scale regarding the worker's perception about fatigue	Through qualitative interviews we explored the characteristics of the workstations and the main tasks of the worker, with focus on his/her perception of fatigue and on the main factors that influence it.
Repetitiveness	It is one of the most frequent causes of the musculoskeletal symptoms. It can be associated both with repetitive movements and repetitive work tasks (Jensen et al., 2002). In the literature, repetitiveness is associated with upper extremity disorders among industrial workers performing manual work (Jensen et al., 2002). Many studies suggest job rotation as a possible solution. However, it is rarely implemented by industrial engineering for its impact on productivity.	This dimension has been monitored for the essence of the line of production's work, maintaining the same workstation for hours and repeating the same movements several times. In this research, the repetitiveness is related to how much the workers perceive their job as repetitive	5 points Likert scale regarding the worker's perception about repetitiveness of the work and movements	Through qualitative interviews, we explored their desire of changing positions more frequently or the need of breaks.
Occupational Safety & Company Attention to Safety	Occupational safety is a common dimension analysed in relation to workers' health. Margolis (1973) identified that the individual attitudes towards safety are determined by the managerial attitude towards safety and are also influenced by workers expectations about it at various levels in the organisation (Coyle, Sleeman and Adams 1995)	In this research, the occupational safety has been analysed in two different perspectives: occupational safety itself for measuring how much the worker feels his/her job as dangerous for his/her health; and company attention to safety that refers to the perception of the workers about the level of attention that the company devotes to the safety and health of workers.	5-point Likert scale regarding the worker's perception about company's attention to safety and perception about occupational safety	The questions were formulated in a broad perspective, not strictly related to the workstation but concerning the whole work environment. Qualitative questions about the origin of the risk perception and what they consider dangerous for their health were included.
Usefulness	Usefulness is a wide construct that can be analysed referring to the person (how much do you feel useful) or referring to the usefulness of their role within the company.	The usefulness of your role within the company has been investigated in this research, with the explicit intention to maintain a clear distinction between the worker identity and the usefulness of the role within the plant.	5-point Likert scale regarding the worker's perception about their usefulness within the company and for their jobs	The questions where related to the factors that influence the perception of being useful, before and after the plant re-engineering.
Job Satisfaction	It is considered an important indicator in the field of workplace health (Cass et al. 2003). It can be viewed as a broad positive emotional reaction and attitude that individuals have towards their jobs (Locke 1978). Job satisfaction has been identified as a potential antecedent of workers' health (Cass et al. 2003) and other organisational outcomes such as absenteeism (Ulleberg and Rundmo 1997), life satisfaction (Judge and Watanabe 1993), performance (Petty, McGee, and Cavender 1984), turnover intent (Hellman 1997), and counterproductive behaviour (Spector 1997)	Recently the discussion has concerned job satisfaction being a unitary concept or composed by several facets of their job (Cass et al. 2003). For the purpose of this research, Job Satisfaction (JS) has been considered as a unitary concept measuring the construct in 5 points.	5-point Likert scale regarding the worker's perception about job satisfaction	The questions were formulated in order to detect the main factors attributed to the job satisfaction.

The psychosocial variables chosen to monitor the PE efficacy are: fatigue, repetitiveness, occupational safety; company attention to safety; usefulness and job satisfaction. Table 1 summarises the variables monitored before and after the PE intervention.

Each dimension was surveyed through a single item in a 5-point Likert scale, followed by some open questions to collect qualitative data. Two cycles of interviews were conducted within Electrolux plant (in 2009 and 2013) by four academic researchers in a private office located in the production building. Interviews were around 20 minutes long and most of participants actively collaborated in answering. All data analysis was performed through open source R package (R Core Team, 2016). Inferential analysis was performed in a nonparametric approach by means of Wilcoxon test, due to the fact that all data distributions were found not normally distributed according to the Shapiro-Wilk test. In all inferential decision a 5% significance level was assumed.

Sample

During the first phase of the study (2009), a sample of 76 blue collar workers both with MSD (39) and healthy (37) had been interviewed to define their perception about the workplace and create a first assessment of the psychosocial variables.

In 2013, after the re-engineering of the production line and the inclusion of specific workstations created for workers with MSD, a new sample of blue collar workers was interviewed.

In the second cycle of interviews, the sample was composed of 31 workers with MSD reintroduced through the PE intervention, 13 healthy workers, and a control group of 6 workers with MSD reintroduced in the line of production without PE procedure. This *unplanned* control group arose from a choice of the line manager not to use the PE intervention for some workers. Although this control group was not foreseen in the research design, authors realised that this small group was extremely interesting to survey in order to verify possible differences between workers with MSD re-introduced through a PE procedure and those re-introduced without it. The line manager confirmed that the choice to avoid PE procedure for these workers was due to time planning rather than workers' characteristics. Although this choice cannot be considered as randomised, it does not refer to any individual preference. Consequently, all the quantitative data in the post intervention phase have been analysed in three groups: healthy, MSD Control and MSD Treated.

The sample has been randomised for what concerns the healthy workers both in 2009 and 2013. On the other hand, the workers with MSD have been included in their totality.

In 2009, the sample was composed of 63 female and 13 male workers. In 2013, 41 females and 9 males were involved in the study. In 2013, after the re-engineering of the production line and the inclusion of specific workstations created for workers with MSD, a new sample of blue collar workers was interviewed (see Table 2).

Table 2. Research sample

SAMPLE				
2009		2013		
MSD	Healthy	MSD treated	MSD control	Healthy
39	37	31	6	13
N = 76			*N* = 50	

Results

Productivity rate

During the period of this study, 36 workers were involved in the PE intervention and successfully reintegrated in the line of production.

The plant management estimates a recovery of 69 working hours per day. In terms of productivity, the effective growth (2009–2013) amounts to 1.5%. The recovery obtained thanks to the PE represents 12% of the total annual productivity gain obtained by the company.

Psychosocial impact of PE intervention

Considering the comparison of the collected data between pre and post intervention, the perception of the workers demonstrate an interesting improvement in each of the psychosocial indicators monitored by the research.

Each indicator (fatigue, repetitiveness, occupational safety, company attention to safety, usefulness and job satisfaction) has been compared in pre and post phases. In the figures below, the stacked bar charts show, in the higher panel, a general

overview of all responses (all Pre Responses vs. All Post Responses). In the second panel, a comparison among pre-post intervention data, divided into healthy (Healthy Pre vs. Healthy Post) and MSD (MSD Pre vs. MSD Control Post and MSD Treated Post).

Fatigue

Overall, the level of perceived fatigue increases (p-value 0.008) from 3.1 to 3.7 after the re-engineering of the plant for all the workers (Figure 3). However, this result finds an explanation in the increased number of washing machines produced per minute after the re-engineering (from 90 to 95). To demonstrate the effectiveness of the PE intervention

(Figure 3), it is important to focus on two comparisons: healthy workers pre (3.0) and post (4.2) re-engineering that show a significant (p-value < 0.001) variation in perceived fatigue, as well as MSD control pre (3.1) and post (4.3) re-engineering (p-value 0.027). On the other hand, MSD treated pre (3.1) and post (3.3) re-engineering do not show a significant variation (p-value 0.497). Data show that the re-engineering of the plant has increased the fatigue among healthy workers. In the meantime, data reveal that the workstations designed for workers with MSD did not permit an increase in the level of perceived fatigue.

Repetitiveness

Overall, the level of perceived repetitiveness – according to all categories analysed – do not vary (p-value D 0.544) before (2.9) and after (3.1) the plant re-engineering (Figure 4). A slight difference was visible among healthy workers (p-value D 0.230) moving from 2.7 to 3.2. No differences were visible among MSD treated (p-value D 0.678), and among MSD control (p-value 0.925) in the pre/post phases. Finally, it seems that neither the plant re-engineering nor the PE intervention has affected the perception of repetitiveness of blue collar workers.

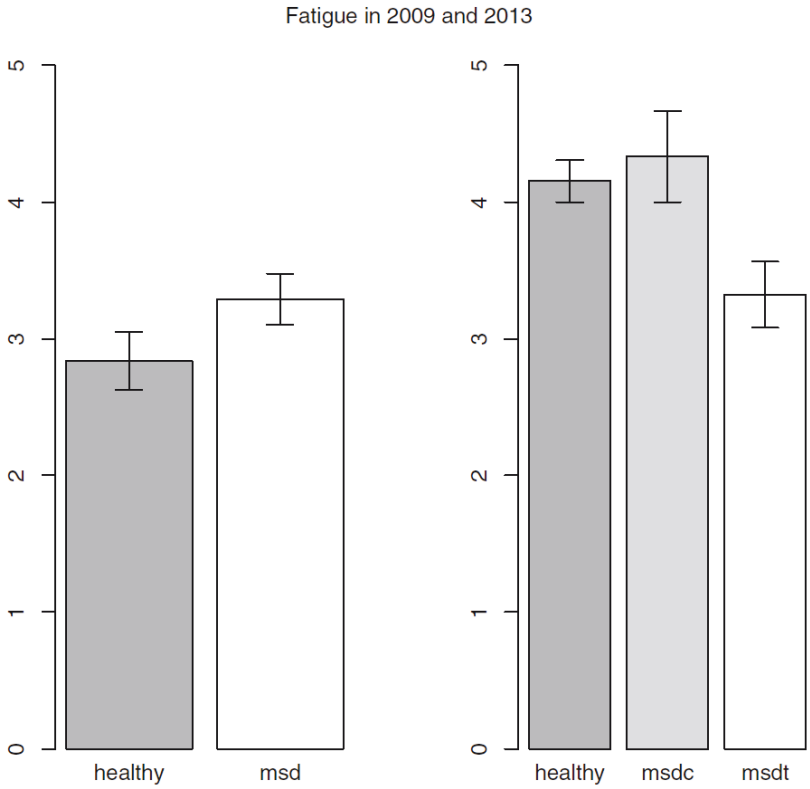

Figure 3. Fatigue mean levels. (Error bars indicate standard errors.)

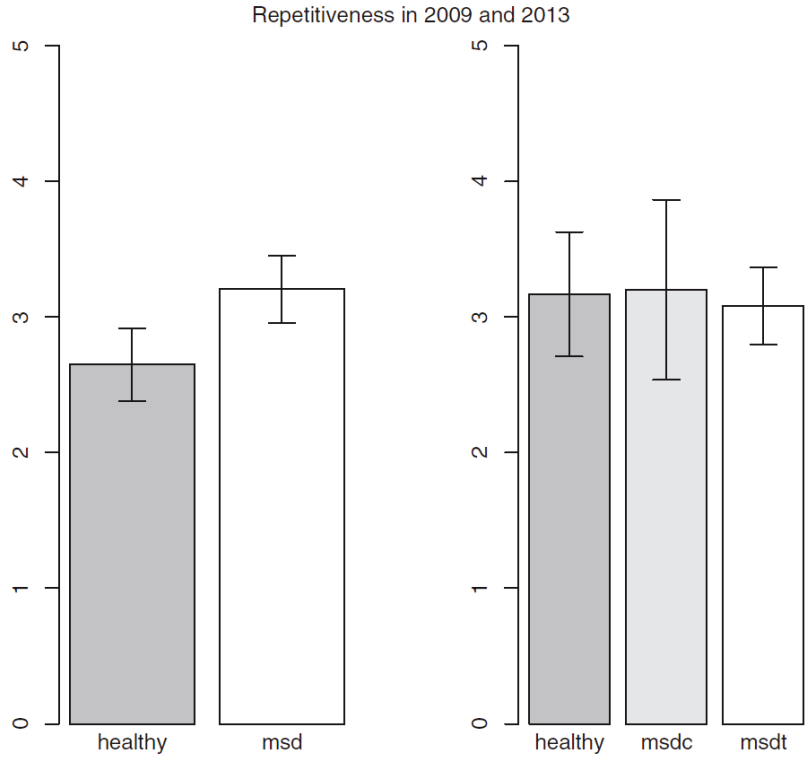

Figure 4. Repetitiveness mean levels. (Error bars indicate standard errors.)

Occupational safety

Data analysis reveals that the workers perception of occupational safety is quite high (Figure 5), both before (3.9) and after (4.4) the re-engineering of the plant, with an overall significant (*p*-value 0.005) increase in the post phase. Comparing both cases of 2009 and 2013, the growth regarding occupational safety for healthy workers (from 4.1 to 4.5) and for MSD control (from 3.7 to 4.3) was not statistically significant (respectively, *p*-value D 0.089 and p-value D 0.191). On the other hand, the perception about occupational safety for MSD-treated group increased significantly (*p*-value D 0.011) from 3.7 to 4.4.

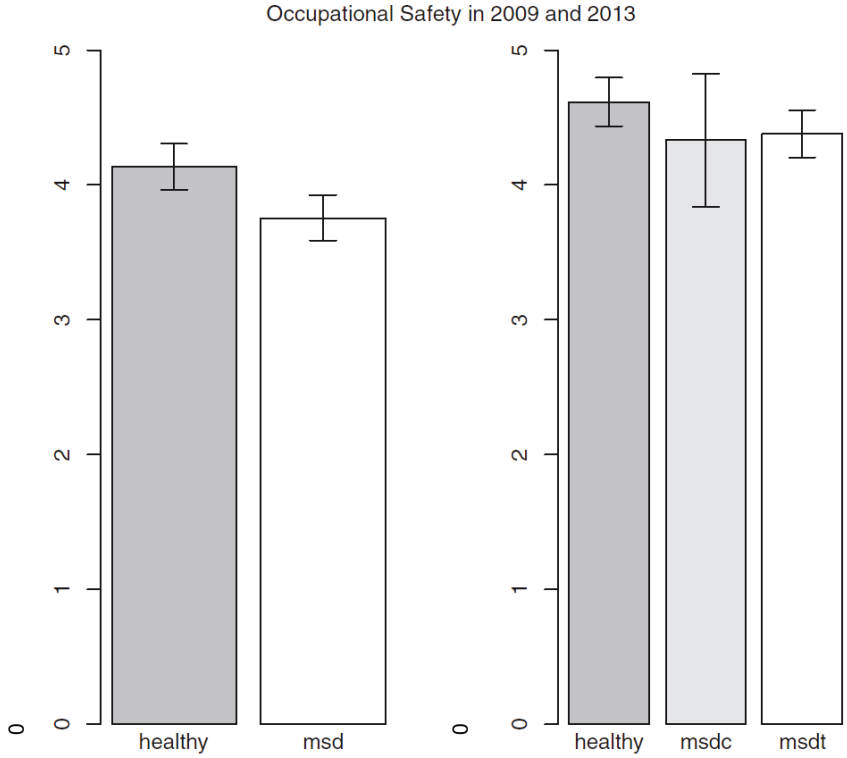

Figure 5. Occupational safety mean levels. (Error bars indicate standard errors.)

Company attention to safety

Considering the attention of the company to the work safety policies, Figure 6 shows a high level of this indicator, both pre and post the re-engineering of the plant. It is part of the corporate organisational culture to take care of the safety, which is widespread among workers 4.1 in 2009, 4.3 in 2013, not a significant variation – *p*-value 0.181). The significant difference between healthy workers and workers with MSD in 2009 was an important aspect revealed by data analysis. Before the re-engineering, when workers with MSD (3.6) were located outside the

line of production, the level of attention to safety attributed to the company was significantly (*p*-value 0.001) lower (−0.8) than among the healthy workers (4.4). It is quite plausible that part of the workers with MSD attributed to the company the responsibility for their MSD. What is important to observe, though, is the effect of the re-engineering of the plant and PE intervention. In fact, in the post phase, the perception of company attention to safety increases, whereas the difference between healthy and workers with MSD is not significant (*p*-value D 0.084) anymore.

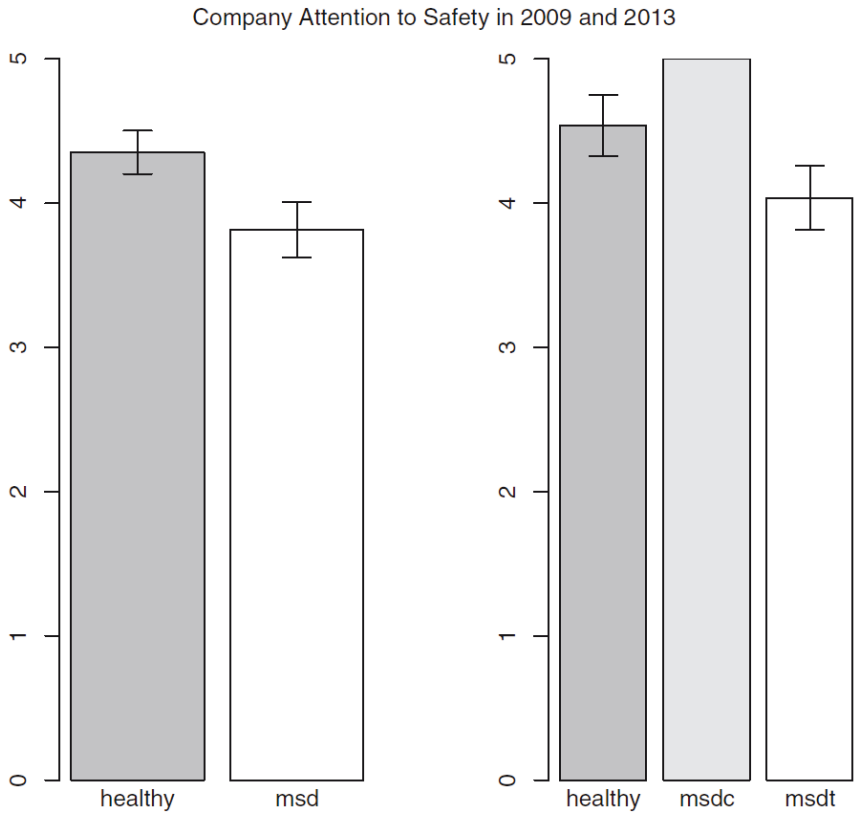

Figure 6. Company attention to safety mean levels. (Error bars indicate standard errors.)

Usefulness

A very relevant result arises from the analysis of changes in the perception of usefulness (Figure 7). While in 2009 healthy workers felt their job significantly (*p*-value 0.026) more useful (4.2) than MSD workers (3.5), in 2013 the situation changed completely: MSD treated workers increased significantly (*p*-value 0.039) their perception (4.2) of feeling useful compared to the previous period (2009), obtaining higher (*p*-value 0.050) levels in usefulness than healthy (3.8) workers.

What is important to underline is also that MSD control (3.7) do not significantly (*p*-value 0.902) modify their perception about usefulness, which seems almost equivalent (*p*-value 0.835) to that of the healthy ones. Considering that both groups of MSD were re-integrated in the production line, the difference in usefulness can definitively be associated to the PE strategy.

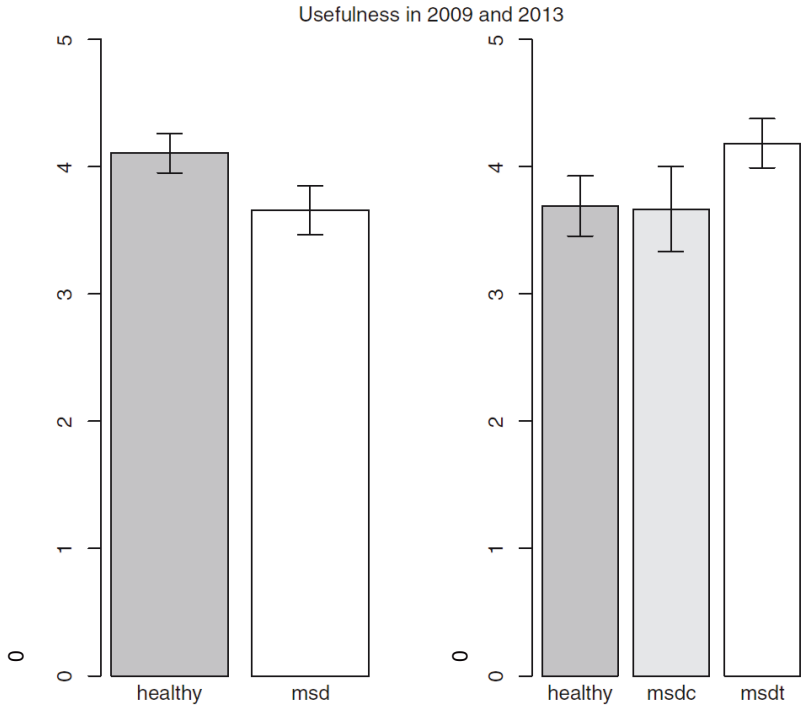

Figure 7. Usefulness mean levels. (Error bars indicate standard errors.)

Job Satisfaction

An important improvement between pre and post phases was related to job satisfaction. The mean level of job satisfaction before the intervention was 3.3. In Figure 8, it is possible to notice that the level of job satisfaction generally increased after intervention for

the whole sample (All Past vs. All Pre), although the difference (C0.2) was not significant (*p*-value D 0.389). Observing the detailed bars, it is possible to note that in 2009 before the PE intervention, the MSD workers (3.0) were significantly (*p*-value 0.044) less satisfied (–0.6) than healthy workers (3.6). In the post intervention, the situation was the opposite: job satisfaction in MSD treated (3.7) has increased, whereas no difference (*p*-value 0.224) among healthy workers (3.2) after the intervention was observable. On the contrary, the control group (MSD

control) showed a low (3.1) level of job satisfaction, without any change (*p*-value D 0.771) compared to 2009.

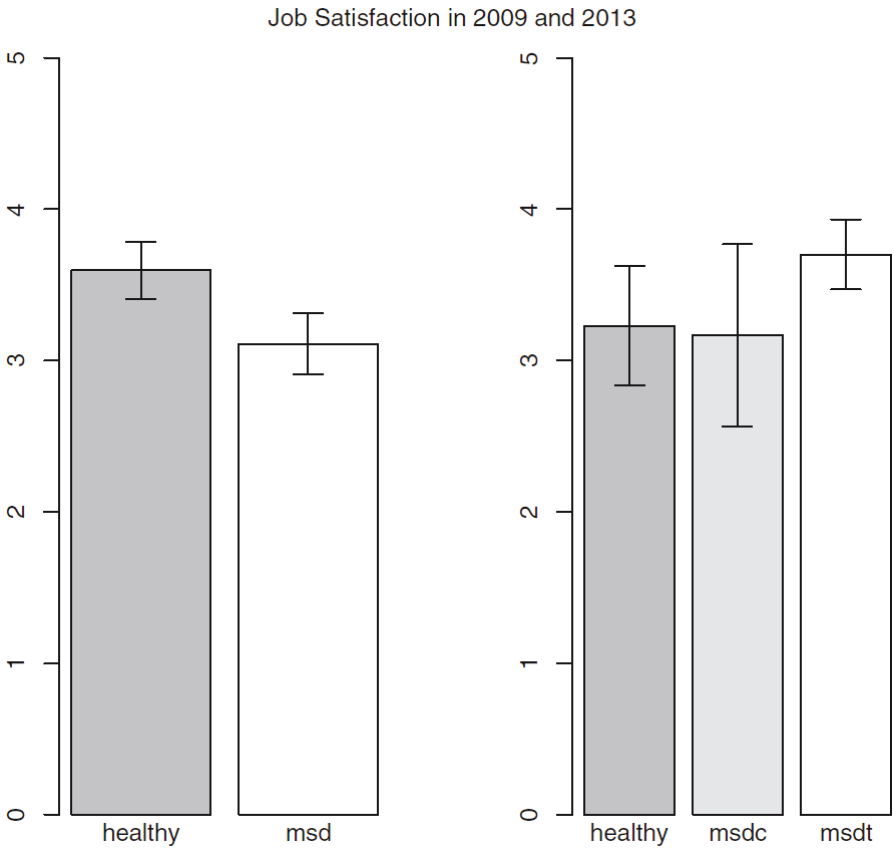

Figure 8. Job satisfaction mean levels. (Error bars indicate standard errors.)

The perception of MSD workers about the PE intervention

Some other important indications arise from the qualitative and quantitative data collected through interviews with workers with MSD, where some specific questions were asked to explore their perception regarding the PE intervention and about the re-integration in the line of production.

The perception of workers with MSD about the PE intervention confirms the data obtained through the quantitative analysis, 65% of workers with MSD confirmed a positive perception about the methodology implemented. The qualitative data reveal that the PE approach boosts workers' perception regarding their usefulness, involvement and nurtures a better communication and feedback rather than feeling intimidated, forced or ignored in the decision making process.

Workers with MSD found in the PE team the opportunity to be listened to and considered in decision-making regarding their job. They described the team as human and kind, and they saw in the implementation of this methodology a possibility of open comparison with the management about their own situation.

Through the interviews, opinions about the pertinence of the workstation with the specific problem of the worker with MDS were also collected. In this case, for most workers with MSD, the workstation seemed appropriate to their needs (median 4 in a 5-point Likert scale).

Despite defining the workstation as appropriate to their specific problem, workers identified some straining elements such as repetitive movements, standing for a long time and the physical effort required in the line of production.

Discussion of results

The research design of the present study aims to demonstrate how PE approach – based on the involvement of the workers in the decision of ergonomics interventions – impacts results in terms of job satisfaction, usefulness, occupational safety and fatigue through the implementation of low tech and low cost changes in the workstation. In the Electrolux plant, the re-engineering of the line consisted of little changes in the design of the workstation in order to make it suitable to the specific physical demand of each worker (for example height-adjustable tables, lift-assisting devices, sit-stand seating, …). This kind of intervention was accompanied by a PE approach (named *Accomodation RAL)* based on the worker's involvement that marks the difference in the satisfaction level of workers included in the process. The data collection by interviews pre and post intervention allowed the research team to have both quantitative data and qualitative elements to recognise the effectiveness of the PE intervention, thanks to a control group of workers with MSD included in the programme without PE. Overall, the monitoring of psychosocial variables shed significant light on the efficacy of PE. The following part examines closely the initial hypotheses in the light of the scientific literature in the field.

A.1. Fatigue and Repetitiveness in workers with MSD decrease after PE intervention.

A.2. Fatigue and Repetitiveness in MSD treated are lower than in control group.

Although during the period of the study (2009–2013), the number of washing machines produced per minute increased by 5 pieces, passing from 90 to 95, the

perception of repetitiveness remained stable in the two periods with no significant difference.

Data show that the re-engineering of the plant and the rise of the rhythm of production have increased the perceived fatigue among healthy workers, but in the meantime the workstations designed for MSD workers did not permit to increase their perception of fatigue.

Concerning the second hypothesis (A2), MSD treated show a slight lower level of fatigue, than MSD control. Besides, a deeper analysis reveals that while fatigue significantly increases (from 2009 to 2013) in healthy workers and in MSD control, the difference between pre and post in workers involved in PE is not significant. Summarising the result of the first hypothesis, the PE intervention does not impact on the perception of repetitiveness, whereas in the perception of fatigue the effect is quite evident in preventing any aggravation of fatigue.

B.1. Organisational Safety (OS) and Company attention to Safety in MSD workers increase after PE intervention.

B.2. OS level and Company attention to Safety in MSD treated are higher than in control group.

The OS increases in the post intervention phase (2013) for all the categories considered (healthy, MSD control, MSD treated). However, the increase is only significant among MSD treated. Further, the company attention to safety significantly grew in the period 2009–2013. In 2009, there was a significant difference between healthy workers and MSD workers in declaring that the company protects their safety. It is quite plausible that MSD workers did not trust the company since they attributed to their jobs the cause of their pathologies. In 2013, after the PE intervention, the attribution to the company role in safety prevention grew in the three groups, confirming that the re-engineering process accompanied by a PE intervention was perceived as a strategy to prevent MSDs and increase safety for the whole workplace, not just a way to increase productivity. Moreover, MSD treated show a higher level in OS and in company attention to safety than MSD control. This confirms both hypotheses. In fact, workers involved in the PE intervention perceive the work environment as safer than workers who are not involved. The change in the perception of occupational safety from 2009 to 2013 of the MSD workers can be associated to an increase of trust in the company, because of MSD workers' perception to be finally considered as a priority by the corporate. The wider effect of the re-engineering among all workers is a mark of distinction for the corporate, where attention for work safety became a prior value in the organisational culture recognised by the workers.

C.1. Usefulness and job satisfaction (JS) in MSD workers increase after PE intervention.

C.2. Usefulness and JS levels in MSD treated are higher than in control group.

Through this study, it has been possible to demonstrate that the perception of being useful increases after a PE intervention. Indeed, results show that MSD treated, after the PE intervention significantly increase their perception of feeling useful compared to the previous period (2009), obtaining higher levels in usefulness than healthy workers. It has been possible to observe even that MSD control group presents a lower level of usefulness than MSD treated. This allows to assert that the usefulness can be directly associated to the PE implementation. The possible explanation lies in the impact that a PE intervention has on the involvement of workers in the production. The workers with MSD who were assigned to a new workstation without a planned process of involvement did not perceive any difference in their contribution to the company. Conversely, the ones who were involved through the PE process understood the change of their contribution to the production.

A similar effect is visible on job satisfaction that increases after the intervention for the whole sample even if not significantly. Furthermore, this impacts especially the MSDs' job satisfaction. Indeed, before the PE intervention, the workers with MSD were significantly less satisfied than healthy workers. After the PE intervention, the situation changed. Job satisfaction in MSD treated increased more than among healthy workers and became significantly higher than MSD control group. These results allow to determine that the PE approach has an impact both on usefulness and job satisfaction. Furthermore, the increase of the job satisfaction and usefulness among the workers with MSD due to the PE intervention underlines the importance of the involvement in decision making: people not involved in the decision presents a lower level of usefulness and job satisfaction. The highest level of involvement occurs when employees perceive to have a power over the decision process. They discover and define problems, identify solutions, choose best option and monitor the result of their decision (McShane and Von Glinow 2003). The PE intervention allows MSD treated to have the control of the decision regarding their jobs.

Following Kogi (2006), the participatory methods used in workplace improvement programmes confirm the importance of developing local good practices to better respond to diversified specific needs. Adjusting the participatory steps to each specific situation would constitute an important step to help each local change group learn from local positive achievements. *Accomodation RAL*, in this perspective, has been projected to be a PE intervention tailored to Electrolux

plant's needs. The focus of this intervention has been the involvement of the MSD workers in the decision making process following the most recognised PE guidelines. Indeed, the core of the PE implementation at Electrolux consisted of changes of the physical design of equipment and workplace (Rivilis et al. 2008), and changes in work tasks (Carrivick, Lee and Yau 2001; Rivilis et al. 2008).

Most studies concentrated their attention on the description of the PE process (Cole et al., 2009) verified through the evaluation of healthcare outcomes as risk factors, pain intensity, injuries reduction, reduction in lost days from work or sickness absence (Rivilis et al. 2008). Moreover, recent reviews suggest more attention to greater detail about programme delivery and intermediate outcomes to identify facilitators and barriers of the programme (Robson et al. 2001; Rivilis et al. 2008; Dale et al. 2016) and psychosocial and work organisation factors (Bongers, Kremer and ter Laak 2002). To the best of the authors' knowledge, studies analysing the impact of PE approach on workers considering psychosocial variables are still absent. This research allowed to pinpoint the workers' perception about their work condition and the impact of the PE strategy on it.

As Rivilis et al. (2008) suggested, we considered a period exceeding two years to account for the time required to implement countable changes. We also used a control group of workers reintroduced in line of production without the involvement in the decision in order to verify the efficacy of the PE intervention.

Through this research, it can be demonstrated that the PE intervention applied in Electrolux favoured the work conditions and acted as a moderator in the increasing of most psychosocial factors investigated in the present study.

Conclusion

This study reveals that the involvement of the worker in a team in order to discuss her/his own workstation is functional/effective. This finds confirmation in the collected data, especially in terms of usefulness, job satisfaction and organisational safety. The effect is less strong in repetitiveness and fatigue that might be more related to the tasks of the job rather than to its perception. Although the collected data confirm the hypotheses of the present study, it is evident that they cannot be easily generalised due to the fact that it represents a single plant study. *Accomodation RAL* represents a PE intervention that has been applied and studied only in Electrolux plant. These results could be influenced by the organisational culture of the company, which is particularly sensitive to these issues. It would be necessary to repeat other studies in different companies to generalise results, although they are widely coherent with the major PE theoretical contributions.

Researchers are aware that the interview method is time consuming and could appear too expensive to be applied in this kind of research. On the other hand, it permits to collect valuable and detailed data, and reduce the misunderstanding in quantitatively measuring psychological constructs, by integrating quantitative surveys with qualitative argumentation. Moreover, it allows to create a confidential climate during the interview, to clarify ambiguous interpretations of items and to explore in detail possible unplanned scenarios.

Finally, longitudinal studies are still rare in literature, which makes it difficult to compare the results of the present study with other similar experiences.

In answering to a stressed request to add value with empirical studies to PE impact, the present research contributes by adding knowledge regarding the monitoring of the effect of worker involvement that seems to be the prior lever in worker commitment, satisfaction and influencing the overall productivity.

Many aspects still need to be explored in order to determine the causality relation among the large variety of psychosocial factors that could determine this process, including other different factors that were not explored in the present research.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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