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Sustainable career and innovation during manufacturing transformation

Introduction

Careers as we know them have died. The career as a series of upward moves, with steadily increasing income, power, status, and security is now a thing of the past. By Hall (1996) Global manufacturing workers are facing unprecedented career challenges due to digitization and automation of manufacturing processes. Demand of uneducated, manual labor has fallen precipitously whereas demand for educated, knowledgeable and highly skilled technical workers is on the rise. This changing landscape means that lifetime employment and career security are no longer the norm in contemporary manufacturing environment (Schreurs et al., 2015; Rafiq and Chin, 2019).

Our research team visited several unmanned food and pharmacy factories in Malaysia, Singapore and China in the late 2018. Looking through the glass partitions we could see thousands of square meters of clean, tidy and modern workshops with a variety of machines and robotic arms working 24 h a day, but could not see a human employee. This shocking scene is very different from that of 10 years ago when most of the factories were heavily reliant on a large number of cheap labor engaging in simple and repetitive tasks as their primary competitive advantage. Notwithstanding the popularity of this unmanned operation has mitigated previous concerns about exploiting labor, especially those low-skilled, blue-collar ones (Chin and Liu, 2015; Rafiq et al., 2019), the increasingly prevalent use of smart machines and robots with artificial intelligence (AI) to replace human jobs has caused new concerns for not only individuals and firms but also for societies and governments about career sustainability and innovation ability among such workers (Dahl, 2011; Jiao et al., 2013, 2015; Koekemoer et al., 2018; Chin, Li, Jiao, Addo and Jawahar, 2019).

How does career sustainability relate to innovation: positive, negative or both?

From a positive angle, along with the advent of the Industrial Revolution 4.0 that has and will continue to transform the nature of manufacturing jobs and careers, some proactive workers are observed to actively engage in a form of crafting behavior (Akkermans and Tims, 2017) – taking the initiative to re-organize and shape their prescribed jobs by changing the scope, tasks or working relationships to better fit their motives, strengths and passions, and thereby creating sustainable careers. This job crafting can be very conductive for employees to highlight their own unique value under such a tough situation of diminishing job opportunities and limited career mobility. Viewed from this angle, we further argue that albeit the threat of involuntary technological unemployment facing manufacturing employees (Frey and Osborne, 2017), the desire to pursue sustainable careers may still kindle the interest of more proactive ones in performing innovative work behaviors.

From a negative stance, although the continuously heightened job demands coupled with increasing job insecurity may to a certain extent propel factory employees to learn expertise in new, previously unfamiliar domains for sustaining careers, the constant strain, in turn, may also exhaust their energetic resources and dis-encourage their work engagement. In light of the conservation of resource (COR) theory (Hobfoll, 2011), intense stress at work that often raises individual fear of losing resources, may lead to critical fatigue and health problems – which is very likely to inhibit employee motivation to
engage in innovation activities with relatively high risks and uncertainties. As such, seeking the sustainability of manufacturing careers today may sometimes become a heavy burden that results in negative impact on workers’ sense of well-being and thereby stifling their passion to innovate.

In consideration of the foregoing, we contend that the fast-paced technological advancement has caused an unheard-of career pandemonium for all levels of manufacturing employees, given the influence of their pursuit for sustainable careers on firm innovation can be positive, negative or both. However, in spite of its significance, the dynamic interplay between career sustainability and innovation among manufacturing workers remains a largely under-researched domain, as digitalization is a relatively recent, continuously evolving phenomenon.

Objectives of the special issue
Given the scarcity of research on these topics, with the support from Editor-in-chief Professor I.M. Jawahar, we organized a special issue (SI) in an attempt to bring to fore ideas, issues and concerns related to this topic. The primary purpose of this SI is to gain a greater understanding of the career-related challenges facing global manufacturing employees in this new digital era from more comprehensive, systematic and cross-disciplinary perspectives. Particular attention is thus paid to linking external innovation dynamics with internal career construction and management of manufacturing organizations based on more pragmatic and multidisciplinary approaches. In short, we aim to contribute to the conceptual clarity of the evolving notion of sustainable careers and thereby expound how managers and workers seek their career sustainability under such a transition context.

A SI workshop was hosted by two guest editors in Beijing Normal University on June 26, 2018, where 9 of 42 submitted abstracts and full papers were presented, and about 35 scholars plus several PhD students participated in the discussion. After a rigorous peer-review process, 11 papers were selected to be included in our SI that covers both the fifth and sixth issues of Career Development International in 2019. We would like to show our sincere gratitude to Professor I.M. Jawahar again for his marvelous guidance in leading us to complete this SI, and to the outstanding efforts of quite a few dedicated reviewers; without their valuable contributions, this SI would not have been possible.

Overview of studies
Built upon a systematic, comprehensive review of literature, the paper written by Chin, Li, Jiao, Addo and Jawahar (2019) integrates the job demands-resources (Bakker and Demerouti, 2017) and COR theory to propose a novel, context-specific framework constituted by four dimensions (i.e. resourceful, flexible, renewable and integrative and RFRI) – which introduces a new measure of “career sustainability” among manufacturing employees during a highly dynamic period of technological revolution. This new RFRI scale clearly illustrates the positive effects of continuous learning, organizational support and governmental involvement on workers’ career sustainability, but also acknowledges pessimism regarding the link between sustaining careers and undertaking innovation by ordinary employees who are aged, less-educated or both. It indicates that such workers, particularly those in emerging and low-income countries, often lack critical resources to bear the potential risks and overcome the predicaments in taking bold and innovative actions.

In contrast, the paper written by Cillo et al (2019) incorporates knowledge management into the career domain, taking an optimistic perspective on the building of a learning culture and its association with career sustainability of blue-collar workers in Italian smart manufacturing companies. Their research draws our attention to a previously under-investigated work group, namely the blue-collar labors (Koekemoer et al., 2018), and offers fresh insights into why soft skills are considered as a newly required competency for
such workers to sustain their careers in high-tech innovative firms. Their results also highlight the positive mediating effect of workers’ commitment to develop soft skills on the relationships between organizational learning (i.e. knowledge exploration, exploitation and transformation among blue-collar employees within organizations) and workers’ career success in the context of ongoing manufacturing innovation. In comparison, Zhang et al. (2019) who deem career adaptability as a vital psychological resource seem to show a more neutral stance on how employees construct their careers in response to the changes brought by automation technology. They suggest that when perceiving more threat or less opportunities employees may either perform passive vocational behaviors such as shifting to another industry or engage in innovative vocational behaviors like job crafting.

China as the world’s biggest manufacturing hub and the second largest economy is undergoing a new round of industrial transformation toward “Made in China 2025” that reflects the arrival of the new information age. For the past three decades, a vast number of peasant workers had rushed into the industrialized coastline cities for seeking more economically rewarding jobs in China’s fast-growing manufacturing sector. Despite the great contributions of these rural laborers to China’s stunning economic growth, they in general were merely able to earn a bare living and suffered severe inequality in wage and education in urban cities in the past. Fortunately, since the Chinese government has largely overhauled the household registration (hukko) system, those migrant workers could finally gain far better pay and avoid being discriminated against as second-class citizens in the early twenty-first century.

Nevertheless, in the recent years, the wide application of AI and information technologies has ruined the traditionally stable bureaucratic career systems of Chinese manufacturing, inducing a career crisis among manufacturing employees. This unfavorable situation where workers are suffering from the intensifying anxieties of not being able to innovate and thereby being laid off has raised quite a few perplexing social and environmental concerns in this context.

The following three papers focus on linking corporate social responsibility (CSR) to employees’ concerns of occupational development. Hu et al. (2019) and Li et al. (2019) shed light on the positive impact of CSR performance in affecting career development of top management and innovative behaviors of non-managerial employees in Chinese manufacturing, respectively. Yang et al. (2019) argue that the magnitude of a safety accident does matter, as it significantly affects the occupational decisions of manufacturing employees. Their study also reports that the company’s CSR initiative may moderate the negative impact of accident magnitude on employee turnover.

Yu et al. (2019) use a sample of 468 employees in 20 manufacturing firms in Taiwan, China, demonstrating how the various roles of the four dimensions of psychological capital play in affecting creativity among employees, whereby their career can be sustained. Beyond the micro-level concerns, the following paper addresses how environmental factors such as policy environment, workplace health and safety influence workers’ career development and choice. Bao et al. (2019) bring to our notice the mediating role of middle-level managers’ openness toward change and the moderating role of top managers’ bottom-line mentality on the relationship between the impact of macro-level environmental policies on middle managers’ proactive behavior in Chinese manufacturing. While the Chinese government has constantly reinforced the policies regarding prevention and control of environmental pollution and ecological destruction, their findings that underscore the extraordinary importance for middle managers to deal with the continuously-updated environmental regulations for career growth thus carry unique practical implications.

Moving from the focus on describing various career-related challenges posed by the contemporary digital transformation among manufacturing workers of both supervisory and non-managerial positions, Xiao et al. (2019) advance to investigate whether the formulation of
proper human resource strategies help reduce employees’ career-related stress. Their research suggests that a well-designed Employee Stock Ownership Plan as a typical, broadly-adopted financial incentive for retaining high-level talents in MNEs also facilitates workers of China’s large, listed manufacturing firms to achieve career sustainability and stability. Chen et al. (2019) propose a conceptual framework embodying how disruptive technologies lead to three new types of occupational transition strategies (i.e. industry-oriented, technology-oriented and comprehensive transition strategies) that enable middle-skilled workers to sustain their manufacturing careers. Caputo et al. (2019) who investigated 1,227 employees of 37 entrepreneurial firms in Europe indicate the urgent need of developing ambidextrous workforces for organizations to cope with labor market turbulence.

**Future research agenda**

Overall, the final 11 studies shed light on a variety of occupation-related opportunities and threats encountered by manufacturing employees of different job positions who seek sustainable careers under severe pressure to innovate. Their findings are instrumental to enhancing conceptual clarification of sustainable careers and provide novel perspectives to the intriguing mechanisms between employee career sustainability and organizational innovation – which reveals a more holistic picture characterizing the changing career landscape in a new, digitalized manufacturing environment. In addition to remarkable theoretical implications, these studies also offer practical advices for manufacturing firms to formulate career strategies and take possible strategic actions in tackling the innovation challenges with respect to their workers’ career sustainability. We believe that this SI partly answers to a renowned puzzle raised by Hall and his associates in the late 1990s about “what the 21st career looks like.”

Whereas quite a few scholars have called for new ways of thinking on conceptualizing career sustainability and have suggested some important and meaningful avenues for future research (Chin, Yang, Zhang, Yu and Cao, 2019), below we only outline several emerging trends on relevant issues with a focus on the innovative context of digital manufacturing.

**Gig work and career sustainability**

The gig economy model (also known as the “shared economy”) underpinned by digital platforms and AI has sharply disrupted our traditional understanding of employment relationships and career sustainability in manufacturing. This gig model that may provide individual workers more flexibilities and opportunities to take back control over their work-life balance are sometimes especially welcome by younger working population (Bamber et al., 2017). Optimists even argue that the newly-emerging labor platform has promising potential to create jobs for those workers with less access to traditional career opportunities (Fabo et al., 2017). Nevertheless, this new form of employment may also cause negative concerns about the deprival of career security. Despite some public debates on the positives and negatives of the growing gig workforce (Benach et al., 2014), there is very little empirical research examining opportunities and challenges. As such, the mechanism between gig work and career sustainability might offer fruitful avenues for future research.

**Developing workers’ meta-competencies for sustaining careers**

Whereas the innovation capacity of a firm mainly hinges on the motivation of human capital, instead of automation technology infrastructures (Malhotra et al., 2016), the technological upgrading and industrial revolution currently underway are expected to keep pushing manufacturing firms to accelerate their speeds of innovation by recruiting for multinational and knowledgeable workers instead of those cheap yet less-literate ones. However, while many manufacturing firms still have deficiencies in training less-educated
blue-collar workers the crucial soft or meta skills (e.g. critical thinking and the ability of learning how to learn) to realize innovation (Chin, Li, Jiao, Addo and Jawahar, 2019), identifying and developing key meta-competencies that enable manufacturing employees sustain careers might be another promising direction for future research.

**Pursuing protean yet sustainable careers beyond boundaries**

The findings of SI imply that it is more appropriate to study career sustainability as a dynamic phenomenon that fluctuates within persons rather than the organizations and occupations in which they worked, as contemporary workers may prefer to self-direct their career development, self-assess career success and to be recruited by multiple employers simultaneously. More specifically, unlike in the past where people often spent a lifetime developing a single career identity and followed a linear upward career path, the younger generations may be more willing to pursue shorter-term agreements with their employers, thereby remaining open to new experiences and opportunities. Integrating this spirit of protean career (Hall, 2004) into our understanding of sustainability of careers promises new avenues of research and insights.

**Conclusions**

**Transcending technological competitions with more humanistic care**

Without a doubt, the job and skill requirements in this modern digital era have far greater complexity than those in the past, which necessitates the development of new person–job fit, occupational competences and appraisal indicators. Production workers nowadays usually need to be trained for operating computerized equipment and electronic devices, and for getting professional licenses from a variety of globally-recognized, impartial and authoritative third party such as the ISO auditor certification, so as to execute quality testing as prescribed in international trade regulations. In the past, factory workers were not expected to have such high levels of skills and knowledge (including both breadth and depth) for undertaking critical and creative thinking, or to display some specific contextual performance that helps constitute a proper social context for fulfilling innovative job assignments (Jawahar and Ferris, 2011). It is thus plausible to see rising employee turnover and career indecision in today’s manufacturing enterprises.

Taking together the foregoing arguments, we conclude that digitalization and automation indeed signify a crucial turning point for global manufacturing employment, the pursuit for career sustainability in such context may not only refer to seeking a long-term stable employment but also to obtaining a sense of personal achievement and satisfaction (Jawahar and Liu, 2017). However, it is worth noting that the digitalized world may bring the spring of hope for young and knowledgeable workers, but the winter of despair for middle-aged and low-educated ones. As such, apart from the focus on the interrelationship and interaction between career sustainability and innovation, we believe more care and compassion should be given to mature-age, mid-career and gig manufacturing employees. It is imperative for global entrepreneurs and policy makers to take the initiative for promoting a positive humanistic spirit in the course of technological innovation whereby happiness and well-being of manufacturing workers can be enhanced.

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References


Time to take corporate innovation initiatives

The consequence of safety accidents in China’s manufacturing industry

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Abstract

Purpose – A bad safety accident at a manufacturing company usually results in casualties and economic losses. The company affected by such an accident must deal with pressure from multiple stakeholder groups. Employees, in particular, play a key role in pushing the affected company to develop strategies to improve occupational safety and health. The purpose of this paper is to seek answers to two questions: does a safety accident affect employee behavior in terms of giving up prospects to develop a career at the affected company? If yes, could innovation initiatives adopted by the company help moderate the negative consequences from a safety accident?

Design/methodology/approach – By investigating 120 safety accidents reported by publicly listed Chinese manufacturing companies between 2009 and 2016, the authors conduct an empirical study using regression-based statistical hypotheses testing to describe the companies’ responses and prospects for their employees.

Findings – The results show that the magnitude of the accident and the accident being caused by an employee error positively affect the turnover of employees. Furthermore, technical innovation initiatives, such as spending on R&D, by the accident-affected companies increase the positive effect of the accident magnitude on employee turnover. On the contrary, management innovation initiatives, such as corporate social responsibility activities, weaken the impact of the accident magnitude and employee error on employee turnover.

Originality/value – This study contributes to knowledge development by adding a crisis perspective in human resource management research. It helps to better understand the impact of safety accidents on employee behavior and the response taken by companies through innovation initiatives.

Keywords Occupational safety and health, Career development, Employee turnover, Innovation initiatives, Safety accident

Introduction

With a large labor force and booming industries, China is part of the global manufacturing chain. The country’s initial competitive advantages, based on availability of cheap resources, including labor, gradually weakened as people’s quality of life and employee
wages increased. To maintain competitiveness, many sectors had to undergo economic restructuring and were upgraded; manufacturing was one of them (Chin and Rowley, 2018). The transformation of the manufacturing industry brought about improvements in product quality resulting in economic benefits. However, rapid technological upgrade, if not performed carefully, can also trigger concerns about safety and, indeed, workplace accidents (Khanzode et al., 2012).

In 2007, China ratified the 1981 International Labour Office’s Convention on Occupational Safety and Health (Casale and Zhu, 2013). The convention’s purpose was to provide safe working environments for employees by offering protection and minimizing the causes of hazards. Nevertheless, industrial accidents and occupational injuries were (and continue to be) a frequent occurrence in China. According to the national workplace safety statistics (www.gov.cn/xinwen/2018-01/29/content_5261953.htm) released by the State Administration of Work Safety, there were 53,000 safety accidents and 38,000 deaths only between January and December 2017. In addition to casualties, these safety accidents also cause serious damage to the affected companies. They range from economic losses and costs due to suspension of production, to reduced competitiveness and employee dissatisfaction.

For example, in 2015, a safety accident of poisoning and suffocation occurred in Zhongyuan Special Steel Company, resulting in six casualties (www.szse.cn/disclosure/listed/bulletinDetail/index.html?b2671d18-7dad-4f94-bd0c-e264f3f58a6). The severe accident was caused by major defects in the project design and poor safety in the production process. Its negative impact on the company included a drop in share price and an increase in the number of employees leaving in search for safer working conditions. In response to the accident and loss of personnel, Zhongyuan Special Steel took some countermeasures, which included updating the company’s safety management standards, developing new technologies and introducing protection procedures for the production floor employees. Many of these countermeasures were based on novel approaches and involved new initiatives, such as: protective alarm systems detecting unacceptable levels of contaminants; changes in the production process to avoid direct exposure; and regular interactive employee training based on virtual reality scenarios. This example raises an interesting question for both researchers and managers: can companies redeem their reputation after a serious safety accident by implementing innovation initiatives? More specifically, can a company use technical innovation (e.g. investing in research and development (R&D)) and management initiatives (e.g. adopting corporate social responsibility (CSR) activities) as a means to recover from the negative effects of a workplace safety accident?

Serious safety accidents are detrimental to companies in both human and financial terms. The affected company usually faces investigation followed by negative evaluation and punishment from the regulators, which triggers a series of unfavorable chain reactions, including employee dissatisfaction (Andrews et al., 2014). As the occupational safety and health of the employees have been threatened by accident that have occurred or potentially could occur, the balance between career development within the company and family well-being can be disrupted (Ito and Brotheridge, 2012). Moreover, the complexity and severity of accidents increase employees’ job insecurity, especially for people employed in front-line production, which reduces their job satisfaction (Lee and Jeong, 2017). Consequently, safety accidents may negatively affect the career plans of the employees, including their intention to maintain a career path in the company and overall well-being. This can lead to employee resignation, turnover, or even collective turnover (Wu et al., 2017).

To retain employees and continue normal operation, accident-stricken companies have to implement measures which improve occupational safety and health performance along the other aspects of the workplace environment. The existing literature on industrial accidents has focused on aspects related to accident prevention and causation (Katsakiori et al., 2009; Pillay, 2015), but little attention has been paid so far to the effectiveness of the safety...
interventions. Therefore, this study links safety accidents with the management strategies of the companies by examining the impact of occupational safety and health management on employee behavior. Previous research has also identified that companies have the options to adopt technical and/or management innovations to strategically adjust their performance (Ling and Nasurdin, 2010). While technical innovation is usually related to technology changes, management innovation is associated with the social structure of an organization. For this study, we use spending on R&D as a proxy to represent the technical innovation initiatives and use CSR activities as a proxy for the management innovation initiatives. Both, the technical and management innovation initiatives impact the employees and their behavior, in particular, loyalty and commitment to continue or abandon a work environment that has experienced a significant industrial accident. It is thus of interest to understand the nature of such innovation initiatives.

Given the evidence that safety accidents may significantly affect employees, previous research has explored the relationship between work injuries and employee turnover (Lee and Jeong, 2017). However, the existing literature has not yet investigated the impact of different accident attributes, such as magnitude and causation, on employee turnover. Empirical studies about the effectiveness of innovation initiatives undertaken by companies in the aftermath of workplace accidents are also lacking. Based on data for Chinese manufacturing companies, this study analytically examines the relationship between safety accidents and employee turnover. It contributes to the literature by including two key attributes of safety accidents, namely, magnitude and employee error, to explain their effects on employee turnover. We also explore how technical and management innovation initiatives should be implemented to help companies regain employee support after such accidents.

Theory and hypothesis development

Career development

Careers can be viewed in different ways, including a series of jobs, a cumulative set of work experiences and a process of personal development (Newman, 2011). How employees’ careers develop is of interest from both, a practical and research point of view. Career development involves an organized, formalized and planned effort to achieve a balance between an employee’s needs and the organization’s workforce requirements (Lips-Wiersma and Hall, 2007). Modern-day studies argue that career development is at one’s control and responsibility, that is, employees can have multiple employment paths of their own choice and less commitment to an organization, whilst developing various commitments toward their profession, professional groups and industry (Foong-Ming, 2008). Specifically, an employee’s career should be successfully integrated into a satisfactory personal and family life. It should provide a sense of sufficient security to meet the well-being and economic needs of the employees, allow flexibility to adapt to one’s changing interests, and offer opportunities for rejuvenation (Greenhaus and Kossek, 2014). Thus, the decision for employees to stay or leave the employing organization depends on whether the job is needed and they are suited to perform it, but also whether it is meaningful, they feel supported or are spiritually satisfied at work (Tnay et al., 2013).

Viewed across the life-span of employees, career paths are impacted and changed because of many factors and considerations. For example, many employees, especially women, are facing contradictory requirements between family and careers (Valcour, 2007). In some cases, middle-aged employees need to balance work requirements with care for elderly parents (Gautun and Hagen, 2010). Rapid technology development is also putting high demands on employees’ skills and abilities to stay up-to-date with many jobs, which are drastically changing and even disappearing (National Academies of Sciences, Engineering and Medicine, 2017). Moreover, in the complex, competitive and volatile market environment, companies may not remain economically viable, and thus reduce or close their operations, resulting in the lay-off of employees.
This study, however, is particularly interested in crises during the daily production and operation processes, which constitute safety accidents. They may affect the physical and mental health of the employees, and subsequently influence their decision to stay at or leave a particular place of employment. In such situations, the employees make conscious decisions whether their loyalty to a workplace should continue or not. The companies, on the other hand, are looking for the best responses to avoid the occurrence of safety accidents in the future.

**Safety accidents and employee turnover**

The market environment for manufacturing companies nowadays is very complex. Economic factors (e.g. the cost of accident prevention), technological aspects (e.g. multi-product industries), work conditions (e.g. safety provisions in the work environment) and human characteristics (e.g. work experience and safety training) are all related to the likelihood of safety accidents (Fabiano et al., 2004). Previous research shows that the consequences from safety accidents are also multifactorial, causing serious casualties, economic losses and employee turnover (Gucer et al., 2003).

In fact, occupational safety and health are a major concern for employees. How to handle this issue is of both academic and practical importance. Previous studies have already indicated a relationship between accidents and employee turnover (Bell and Grushecky, 2006; Burt et al., 2009). Safety accidents can cause personal injury to employees, damage the work environment and reduce job satisfaction. Production employees in manufacturing companies are particularly vulnerable to such negative impacts. If concerned about their physical and mental health, employees may decide to leave the work environment where they feel threatened and dissatisfied with the company’s safety practices (Amponsah-Tawiah and Mensah, 2016).

The unfolding model of voluntary employee turnover (Lee and Mitchell, 1994) suggests that a negative shock to the organization’s system will affect the behavior of the employees. A negative shock is a very distinguishable event that will push employees toward deliberate judgments about their jobs. It can even lead employees to voluntary quitting without considering other job alternatives (Morrell et al., 2008). A safety accident may trigger job dissatisfaction and be considered incompatible with work values and well-being standards, making employees to leave the company (Heavey et al., 2013). The idea of quitting is also contagious, particularly after a safety accident – witnessing colleagues leaving may increase others’ desire to do the same. Safety accidents may thus lead to collective turnover (Hancock et al., 2017). In line with previous research (Hausknecht and Trevor, 2011), this study defines employee turnover as the aggregate level of employee departures within a group, work unit or organization.

Safety accidents are usually assessed and investigated by the senior management and relevant departments. According to the regulations governing the reporting, investigation and risk management of production safety accidents (www.gov.cn/zwgk/2007-04/19/content_588577.htm), the analysis is centered on the magnitude of the accident and the cause behind it. These two aspects are discussed further below.

**Accident magnitude.** Serious safety accidents result in casualties in the affected companies. In this study, accident magnitude refers to the total number of employee casualties occurred as a result of a safety accident (Odero et al., 2003). Safety accidents damage the company’s reputation and change investors’ confidence. On the other hand, they harm the interests of the employees and decrease their confidence in personal safety, which results in diminished loyalty and even in them leaving the company (Andrews et al., 2014). According to the expectancy violations theory, conforming behavior remains largely unnoticed, but violations attract attention for their salience and deviance from commonly held expectations (Floyd et al., 1999). A safety accident is an example of a negative violation of employee expectations, and is likely to generate negative emotional responses. That is, manufacturing companies with safety accidents may lose employee approval and
commitment because the accident violates the promise for occupational safety and places employees at risk (Gucer et al., 2003). The following hypothesis is tested to empirically study the relationship between accident magnitude and employee turnover:

\[ H1. \text{Ceteris paribus, accident magnitude positively predicts employee turnover a company encounters.} \]

**Employee error.** There are many reasons for safety accidents in a workplace and previous studies have looked at their causes. Raouf (1998) classifies accident causation as immediate causes (e.g. unsafe acts) and contributing causes (e.g. safety management performance). Katsakiori et al. (2009) propose an accident model to identify active and latent causes (e.g. organizational and personal factors). In general, the likelihood for an accident is affected by the type of activities performed, tasks and job levels combined with personal risk factors. A number of studies have investigated worker characteristics associated with severity and likelihood of safety accidents occurring (Niza et al., 2008; Hofmann et al., 2017). Employee error is one possible cause of safety accidents. The accident investigation reports released by the regulators disclose whether a safety accident was caused by an employee error. This study investigates the relationship between employee error triggered accidents and employee behavior after an accident.

From the perspective of expectancy violations, safety accidents may create cognitive dissonance by altering the individuals’ views of the way things should be. Employees in a high-accident working environment may become more worried about their safety, and thus lower their recognition and commitment to the affiliated company (Heavey et al., 2013). In addition, turnover caused by safety accidents due to employee errors can be contagious because other employees in the same company will also be worried about their occupational safety as they may make the same mistakes. Hence, a safety accident caused by an employee error is likely to subsequently increase the collective employee turnover. We therefore hypothesize the following argument:

\[ H2. \text{Ceteris paribus, employee error caused accidents positively predict employee turnover a company encounters.} \]

**Innovation initiatives following accidents**

Organizational innovation is usually defined as the adoption of a new idea or behavior by an organization (Daft, 1978). According to Crossan and Apaydin (2010), organizations cope with changes and uncertainties by applying new technology and successfully integrating technical and management improvements in their organizational structures. Conceptually, “technical innovations are those that occur in the operating component and affect the technical system of an organization” (Damanpour et al., 1989). Hence, they affect the used equipment and production methods. Although the employees are in contact with these innovations, they are not specifically aimed at them. By comparison, people are the main focus of the management innovations which involve the generation and implementation of new managing practices, processes or structures, and are intended to further organizational goals (Birkinshaw et al., 2008). In this study, we investigate the effects of the companies’ innovation initiatives from the perspective of technical and management innovations represented by R&D spending and CSR activity.

**R&D spending.** Technical innovations are defined as a means of changing and improving the performance of the technical system and are directly related to the main activities of an organization (Damanpour et al., 1989). Rogers (2010) proposes that technical innovations can be the implementation of an idea for a new product or the introduction of new elements in an organization’s production or services. Technical innovations generate changes in skill requirements, training needs and the occupational mix of employment, which, in turn, affect
hiring, staffing patterns and employees’ career development (Flynn, 1988). Thus, technical innovations have an impact on the human resources management of companies. In line with Latham and Braun (2009), we use R&D spending – that is, investment in R&D, as a proxy for technical innovations in a company.

Moreover, organizational stability is highly correlated with employee turnover, indicating that employees are more likely to stay in a stable work environment in line with their desires for career development (Lee and Jeong, 2017). When employees’ occupational safety and health are threatened by accidents, they may perceive job insecurity as an infraction of the implicit or explicit norm of reciprocity within the company (Hofmann et al., 2017). Consequently, they will alter their behavioral attitudes, for example, by reducing their commitment to the company and increasing turnover intentions (Cheng and Chan, 2008). If a company affected by a safety accident invests in R&D and adopts a technical innovation, the employees need to adapt to new technical requirements or face new operating procedures. This further increases their job insecurity. Therefore, technical innovations after a safety accident may act as a catalyst and stimulate employee turnover by further diminishing the stability of the work environment.

Two further hypotheses are formulated as follows:

H3a. Ceteris paribus, R&D spending amplifies the impact of accident magnitude on employee turnover a company encounters.

H3b. Ceteris paribus, R&D spending amplifies the impact of employee error caused accidents on employee turnover a company encounters.

CSR activity. CSR is defined as “categories or levels of economic, legal, ethical and discretionary activities of a business entity as adapted to the values and expectations of society” (Joyner and Payne, 2002). The CSR activities are related to the company’s perceived societal or stakeholder obligations (Lee et al., 2013). Employees are highly salient stakeholders to whom the firm owes a perfect duty. This means that they have significant power and legitimacy with which to influence the firm (Greenwood, 2007).

In the aftermath of safety accidents, many accident-stricken companies put new safety improvement initiatives in place which help to monitor their employees’ safe and unsafe actions. Management innovation is defined as a difference in the form, quality or structure over time of the management activities in an organization. It represents a particular form of organizational change and introduces a novelty in an established organization (Birkinshaw et al., 2008). For this study, we consider management innovations as innovative CSR activities targeted at employees after safety accidents, such as new safety training, emotional support and distribution of compensation. Moreover, CSR activities can significantly reduce the negative impacts of crises, and repair the relationship with stakeholders (e.g. employees) by establishing a positive corporate image (Jamali, 2008). Hence, employee-related CSR activities as management innovation initiatives, can improve employees’ happiness at work, enhance their job satisfaction and retain employees (Bode et al., 2015). The following two hypotheses are further formulated:

H4a. Ceteris paribus, CSR activities attenuate the impact of accident magnitude on employee turnover a company encounters.

H4b. Ceteris paribus, CSR activities attenuate the impact of employee error caused accidents on employee turnover a company encounters.

Method
Sample
The sample for this study was collected from the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) – the only two stock exchanges in mainland China.
approved by government regulators. We analyzed listed manufacturing companies as they are more visible with information publicly available. They are also expected to be closely scrutinized by regulators and the media.

To produce a precise sample, a multistep process was developed to search and gather data about safety accidents. Usually, when an accident occurs, the involved listed company announces details about it to its stakeholders and the public via the stock exchange. Hence, we first searched the headlines of accident announcements on the websites of SSE (www.sse.com.cn/) and SZSE (www.szse.cn/), and created the initial set of terms used for a more detailed search. Next, we searched media reports which quoted the accident announcements and identified similar terms. Then we comprehensively analyzed the above results and narrowed the search terms to improve the accuracy of the findings. Finally, we identified the revised keywords to include “safety accident,” “production accident” and “fire accident,” and constructed the sample using them.

Following this procedure, each announcement from the search was individually reviewed to verify that it involved a safety accident which occurred in a manufacturing company. To avoid the risk of confounding effects, we eliminated accidents which had unclear announcements or occurred in companies viewed by the government as being at high risk in terms of quality of products and financial information (Green et al., 2009). We also eliminated accidents which occurred in the same companies after another negative event during the same or following year. The outcome was 120 safety accidents from 110 manufacturing companies identified for the period between 2009 and 2016.

**Dependent variable**
Employee turnover is the dependent variable for the regression model to test the hypotheses. Employees in manufacturing companies with safety accidents have lower-level perceptions about the organizational safety environment, which reduces their job satisfaction. This is especially the case for production employees whose interests are directly affected. Furthermore, employee job dissatisfaction may impact career development prospects in the company and subsequently induce turnover behaviors (Cheng and Chan, 2008).

Thus, we measured employee turnover by dividing the number of production employees who left the affected companies in the year after the accidents, by the average number of production employees in the year and the following year of the accidents (Hausknecht and Trevor, 2011). The data were collected from the companies’ annual reports detailing the number of production employees.

**Independent variables**
The independent variables include accident magnitude, employee error, R&D spending and CSR activity. Accident magnitude was a count of employee casualties related to the safety accidents collected from the accident announcements and accident investigation reports. Employee error was measured as a dummy variable. If the accident was due to employee errors, it was coded as 1; if the accident was caused by other factors, it was coded as 0. R&D spending was measured as log-transformed values of R&D expenditures of the affected company in the year following the accident.

CSR activity was measured as a count of the employee-related activities implemented by the companies following the accident. The CSR activity needs to be different from the activities conducted during daily operations and should not have direct effects on the company’s economic benefits. Examples include new safety training, counseling and changes to improve the well-being of the employees. First, the authors collected all the news posted on the affected companies’ websites within a year from the accident. Next, we invited two professional researchers in this field to review all collected news, identify and code CSR activities. The standard they followed was that if the activity in the news was a positive
activity for the employees, it was defined as a CSR activity and coded as 1. Alternatively, as 0, if it was not counted. The analysis of the discrepancies produced a relatively high inter-rater reliability score of 0.915. Finally, we summed up the CSR activities and took the total as the measure of CSR activity.

**Control variables**

We controlled for firm size, leverage, past negative event, past employee turnover, past R&D spending, average wage, accident loss and the year the accident took place. Firm size was measured as the log-transformed value of the total assets of the company reported during the year of the accident. Leverage was measured as the debt to equity ratio and obtained from the China Stock Market and Accounting Research Database. Past negative event was a count of previous negative events in which the company was involved one year prior to the accident. Past employee turnover was calculated by dividing the number of production employees who left the affected company in the year of the accident by the average number of production employees in the year of the accident and the previous year. Past R&D spending and average wage were measured, respectively, as the log-transformed values of R&D expenditures and per capita income of employees in the year of the accident. Accident loss was the direct economic loss of the affected company caused by the accident. Year was included as a dummy variable, based on the year in which the accident occurred.

**Results**

This study uses multiple linear regression to test the four hypotheses. Table I presents the means, standard deviations and correlations between all variables studied in the regression analysis. We note that employee turnover, past R&D spending and R&D spending are negatively correlated with CSR activity, and accident magnitude is positively correlated with CSR activity. There is also positive correlation between past R&D spending and R&D spending, and negative correlation between accident magnitude and past negative event. Furthermore, accident magnitude, employee error and average wage are positively correlated with accident loss and firm size, respectively. Finally, accident loss is positively correlated with firm size.

Table II displays the regression models predicting employee turnover in the affected companies. Model 1 contains only the control variables, while Model 2 includes the main effects of accident magnitude, employee error, R&D spending and CSR activity. The remaining models include the four interaction effects, respectively. We examined the variance inflation factors (VIF) to test the presence of multicollinearity and found the highest VIF was 2.964 in the six models, which is well below the accepted threshold of 10 (Neter et al., 1985). Among the control variables in Model 1, the effect of past negative event on employee turnover is positive and significant ($\beta = 0.025$, $p = 0.035$). The effect of past employee turnover on employee turnover is negative and significant ($\beta = -0.162$, $p = 0.056$).

Model 2 tests the main effects of accident magnitude and employee error. Accident magnitude significantly and positively predicts employee turnover ($\beta = 0.004$, $p = 0.006$), supporting $H1$ that severe safety accidents will exacerbate employee turnover. Moreover, we find a significant positive effect of employee error on employee turnover ($\beta = 0.038$, $p = 0.007$), supporting $H2$ that accidents that are related to employee errors motivate more employees to leave. Models 3–6 examine the moderating effects of R&D spending and CSR activity. As shown in Model 3, there is a marginally significant positive effect of the interaction between R&D spending and accident magnitude on employee turnover ($\beta = 0.001$, $p = 0.086$) (Noack et al., 2017). This means that the impact of casualties on employee turnover increases for companies which spend more on R&D after the accident. Thus, the result is supportive for $H3a$. Likewise, Model 4 tests the interaction between R&D
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Notes: $n = 120$. $p$-value are in parentheses.
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Notes: $n = 120$. Values in table are unstandardized regression coefficients. Standard errors are in parentheses.
spending and employee error. The result is insignificant and indicates that $H3b$ is not supported.

Model 5 shows a significant negative effect of CSR activity on the relationship between accident magnitude and employee turnover ($\beta = -0.001, p = 0.039$). This supports $H4a$ that the positive effect of accident magnitude on employee turnover weakens for companies which conduct more CSR activities. Finally, Model 6 shows that the interaction between CSR activity and employee error is negative and significant ($\beta = -0.005, p = 0.004$), thus supporting $H4b$.

By graphically examining the effects of the chosen moderators, additional insight is provided about the ability of R&D spending and CSR activity to influence the retaining of employees (Hayes, 2013). Figures 1–3 are drawn using the respective coefficients from

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**Figure 1.**
Interaction effect of accident magnitude and R&D spending on employee turnover

**Figure 2.**
Interaction effect of accident magnitude and CSR activity on employee turnover
Model 2, with “Low” indicating the level of the standardized variable is one standard deviation below the mean and “high,” one standard deviation above the mean. Figure 1 shows that higher R&D spending enhances the effect accident magnitude has on employee turnover more than lower R&D spending does. Figure 2 suggests that greater CSR activity more effectively mitigates the effect accident magnitude has on employee turnover than lower CSR activity does. Figure 3 shows a significantly negative moderating effect on the relationship between employee error and employee turnover in the condition of high CSR activity. That is, the positive impact of employee error caused accidents on employee turnover weakens for companies which undertake more CSR activities.

Discussion
This study sheds light on the impacts of companies’ innovation initiatives on employee turnover after safety accidents. Using 120 safety accidents which occurred in China’s listed manufacturing companies, we explored the relationship between accident magnitude, employee error, R&D spending, CSR activity and employee turnover. The empirical results suggest that the effects of innovation initiatives on employee turnover following the accident are more complex than previously understood.

First, we use accident attributes as the antecedent variables to investigate the effects of safety accidents on employee turnover. The results indicate that accident magnitude and employee error both increase the turnover rate of production employees in the year following the accident. In other words, safety accidents which result in serious casualties or are due to employee errors will trigger the departure of other employees from the company. These findings enhance the current understanding of the relationship between safety accidents and employee turnover (Bell and Grushecky, 2006). They also enrich the study of the causes of collective turnover by adding a safety accident perspective (Hancock et al., 2017).

The examination of the companies’ innovation initiatives reveals patterns that are relevant to research on company innovation and the growing literature on human resources management. A new insight provided by this study is that the companies’ technical innovations (i.e. R&D spending) would increase the negative impact of the accident magnitude on employee behavior and aggravate employee turnover. When a safety accident occurs in a company, the occupational safety and health of its employees are often seriously threatened.
Employees will worry about their personal safety and reduce their trust in the company (O'Toole, 2002). In poor safety circumstances, technical innovation introduced by the affected company not only brings new work challenges to employees, but also makes the production environment more complex and unbalanced. Therefore, companies engaged in technical innovation initiatives after safety accidents will face higher levels of employee turnover. Conversely, companies' management innovation initiatives (i.e. CSR activities) significantly reduce the negative impact of accident magnitude and employee error and help the affected companies retain production employees. A possible explanation is that CSR activities help manage social evaluations, augment reputation, or can alter stakeholders' negative judgments after a negative event (Lee et al., 2013). The affected companies can use CSR activities to eliminate the expectation gap with employees and to meet societal perceptions.

Additionally, the results show that past negative events of the affected company positively affect employee turnover, while past employee turnover negatively affects employee turnover in the year after the accident. These findings suggest that past negative events may have a negative impact on the company’s overall image. Once a safety accident occurs, employees of companies with more negative events in the past are more likely to leave. By comparison, companies with higher levels of employee turnover in the accident year usually take measures to communicate with employees. These employee-related measures can reduce employee turnover in the year following the accident.

**Implication and limitation**

By studying the safety accidents in Chinese listed manufacturing companies, this study explores the strategies to manage employee turnover. The findings have both academic and practical implications. Moreover, this study contributes to the literature by linking human resource management with crisis management and by providing insights about strategies for managing employee turnover (Burt et al., 2009). Furthermore, by exploring the impact of the companies’ innovation initiatives (i.e. technical innovation and management innovation) on employee behavior after an accident, it enriches the organizational innovation management literature (Ling and Nasurdin, 2010).

In addition, this study extends practical implications for companies to better cope with the aftermath of safety accidents and retain employees. First, since safety accidents have negative effects on many aspects of the company, managers are strongly advised to pay attention to safety management in routine times and avoid the occurrence of major safety accidents. For example, strengthening safety education, conducting safety inspections on a regular basis and improving the safety management systems are effective ways to reduce the risk of accidents. Second, managers should recognize the impact a safety accident has on production employees and implement appropriate innovation initiatives to communicate with them. According to our research findings, managers should not prioritize technical innovation initiatives after serious safety accidents, but instead create a stable work environment and harmonious internal atmosphere. Moreover, managers could promote employee-related CSR activities after the accident to repair their relationship with the employees, strengthen their organizational commitment and enhance their job satisfaction, which, in turn, improves their loyalty and reduces turnover intentions. Finally, managers should regularly monitor employee issues to ensure occupational safety initiatives remain relevant and up-to-date.

Limitations in the current study, however, should also be acknowledged. First, the sample of this study involves only the listed companies in China, which are more visible and accessible to the public. This may limit the generalizability of the findings. Future studies could consider the representation of non-listed companies. While the findings show that management innovation (i.e. employee-related CSR activities) would be helpful in managing safety accidents and reduce employee turnover, it is not possible to ascertain whether the
involved companies should use CSR activities as strategic practices. Future research could add to the findings of the current study by revealing the motivations of managers for implementing CSR activities. Another area of future research is to explore these issues outside China (Chin et al., 2018), which would allow for drawing international comparisons.

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The role of psychological capital in employee creativity

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Abstract

Purpose – The purpose of this paper is to examine the roles of four distinct but related aspects of psychological capital – optimism, hope, self-efficacy and resilience – in facilitating employee creativity. Drawing on the psychological capital perspective and the creativity literature, we propose that optimism and hope increase employee self-efficacy and resilience, which benefits employee creativity. Moreover, the authors hypothesize that self-efficacy and resilience have mediating roles in the psychological capital context, which, in turn, has a positive effect on individual employees’ creativity.

Design/methodology/approach – Data were obtained from a survey of multiple manufacturing firms on individual employee psychological capital and creativity. Structural equation modeling was used to test the hypotheses regarding psychological capital and creativity in a sample of 468 individual employees.

Findings – The results provide evidence that only resilience plays a mediating role between optimism and hope and employee creativity. The authors found that psychological capital is positively related to employee creativity.

Practical implications – These findings provide guidance for understanding how to better address the psychological capital that contributes to employee creativity in the workplace. Specifically, this study provides a rationale for facilitating the development of employee creativity by exposing the effect and path of psychological capital.

Originality/value – This study is the first to examine the antecedents and mediating role of four distinct yet correlated dimensions of psychological capital on employee creativity. The findings of this study contribute to the theoretical development of a conceptual model that investigates the black box of the four aspects of psychological capital and creativity.

Keywords Self-efficacy, Resilience, Hope, Employee creativity, Optimism, Psychological capital

Introduction

In an era of global competition and dynamic environments, the workplace and work lives of employees are transformed by economic, social and technological changes and developments. The constantly changing world also poses challenges for organizations and requires employee to be creative, which manifests as thriving on chaos, being proactive, and growing by overcoming hardships and difficulties. Previous research has posited that employee creativity can fundamentally contribute to the workplace (Madjar et al., 2002) and organizational competitive advantage (George and Zhou, 2002; Oldham and...
Cummings, 1996; Amabile, 1996; Argyris and Schön, 1978; Nonaka, 1991; Oldham, 2002; Chin et al., 2016). The findings from previous studies were based on the assumption that employee creativity is beneficial for workplace and organizational outcomes, and researchers have devoted considerable attention to identifying the importance of employee creativity; however, they have shown much less interest in its antecedents and effects. Some researchers believe that employee creativity flourishes when the role of psychological capital, hereafter referred to as PsyCap, has strong potential to promote employee creativity (Avey et al., 2012; Cai et al., 2018; Rego et al., 2012; Sweetman et al., 2011). To date, only a few studies have attempted to determine the impact of PsyCap on employee creativity in the workplace context. Cai et al. (2018) argued that the PsyCap construct as a whole is associated with positive employee creativity rather than each of its four distinct aspects. However, each of the four aspects of PsyCap may independently influence employee creativity and thus lead to different desirable outcomes (Rego et al., 2014). This study attempts to address this issue by investigating how four distinct aspects of PsyCap, including optimism, hope, self-efficacy and resilience, impact employee creativity.

The purpose of the present study is to develop and test how PsyCap and its four distinct aspects drive individual employee creativity. Building on the componential theory of creativity (Amabile, 1996), we develop this perspective by exploring the black box of PsyCap, which may foster individual creativity. Consistent with the componential theory of the creativity perspective, employee creativity results in beneficial outcomes that vary among individuals, including domain-relevant skills, creativity-relevant processes and intrinsic task motivation (Amabile, 1983, 1985, 2013). With its emphasis on intrinsic motivation and creativity, we believe that the componential theory of creativity may offer a rich conceptual framework through which to examine the complexities related to the four distinct aspects of PsyCap and the resulting creative outcomes. Drawing on the connection between the componential theory of creativity and PsyCap, we propose that self-efficacy and resilience mediate the extent to which individual optimism and hope are associated with employee creativity.

Our study thus makes a number of potential contributions. First, we introduce the componential theory of creativity (Amabile, 1996), which is tied to employees’ intrinsic motivation, domain expertise, creative thinking and creative action. By focusing on the componential theory of creativity, we address a gap in the literature concerning the relationship between PsyCap and creativity using a well-elaborated self-construct that has been extensively tested in various research fields. Second, because our study is based on a theoretical framework that combines the literature on PsyCap and the componential theory of creativity, it provides an important integrative theoretical contribution. This integration should enable us to address a number of outstanding issues and gaps in both the PsyCap and creativity research. Third, we add previously unexplored constructs to the current literature on the relationship between the four distinct aspects of PsyCap and employees’ creativity to show their distinct individual and synergistic influences, thereby employing protean and holistic perspectives more precisely in the relationship between PsyCap and employees’ creativity outcomes. Accordingly, this study develops a conceptual model and hypothesizes the mediating role of self-efficacy and resilience between hope and optimism and employee creativity. Fourth, based on the componential theory of creativity, we hypothesize that self-efficacy and resilience mediate the effects of hope and optimism on employee creativity. Our results extend previous research (e.g. Avey et al., 2012; Cai et al., 2018; Sweetman et al., 2011) and suggest that self-efficacy and resilience serve as necessary conduits for enhancing employees’ creativity. We also highlight the critical role of self-efficacy and resilience for employees involved in at least the idea generation phase.
Research background and hypotheses

Employee PsyCap and creativity

Some theories suggest that PsyCap may be particularly susceptible to the influence of employees’ positive behavior, mainly because positive behavior leads to positive affect and cognition that stimulates creativity (Avey et al., 2010, 2012; Luthans et al., 2007; Sweetman et al., 2011; Cai et al., 2018; Chin et al., 2018). For example, Newman et al. (2018) argue that positive PsyCap promotes the development of personal turnover intentions and organizational commitment. Similarly, employees’ positive PsyCap may drive individual positive thinking and behavior in the workplace or in career development (Cenciotti et al., 2017; Alessandri et al., 2018). Positive PsyCap can be viewed as a set of justified psychological beliefs that can enhance personal capacity for effective action and behavioral outcomes (Cenciotti et al., 2017; Alessandri et al., 2018). Many previous studies have focused on identifying the dimensions of PsyCap and examining PsyCap’s roles in and effects on employees’ outcomes in areas such as future outcomes (Fredrikson, 2001), work attitude (Avey et al., 2010; Newman et al., 2018), work performance (Avey et al., 2010; Alessandri et al., 2018; Luthans et al. 2007; Madrid et al., 2018), engagement (Alessandri et al., 2018), career success (Cenciotti et al., 2017; Alessandri et al., 2018), innovative performance (Abbas and Raja, 2015) and creativity (Rego et al., 2012). To understand the findings of past studies, it is helpful to combine the four positive PsyCap components that act synergistically to promote improved employee attitudes, behaviors and outcomes.

Although positive PsyCap is widely recognized as a potentially vital source of intrinsic motivation, relatively less attention has been devoted to the possible characteristics of PsyCap that facilitate the creativity of individual employees (Sweetman et al., 2011; Rego et al., 2012; Zubair and Kamal, 2015). In recent decades, researchers have started to address this issue and have attempted to explain and predict creativity or creative performance using PsyCap (e.g. Sweetman et al., 2011; Rego et al., 2012; Zubair and Kamal, 2015). In these efforts, most researchers have tried to identify the impact of PsyCap and its components on employee creativity as an antecedent (Rego et al., 2012), mediator (Sweetman et al., 2011) or moderator (Zubair and Kamal, 2015). In these studies, PsyCap was treated as an aggregation of its four components, e.g., efficacy, optimism, hope and resilience, and it was used in regression or path analysis along with other antecedents. Additionally, researchers have focused more on the influence of general PsyCap on creative behaviors than on the dimensions of PsyCap. Zubair and Kamal (2015) argued for conceptualizing PsyCap as a core construct or an integrated resource set rather than as isolated components based on psychological resource theory because the dimensions have been empirically found to be interactive and synergistic (Cozzarelli, 1993; Rini et al., 1999).

In this study, we propose that not all characteristics of PsyCap are equally important for influencing the creativity of individual employees and that the extent to which the components of PsyCap are conducive to the generation of employees’ creativity depends on the first-order psychological resources of self-efficacy, optimism, hope and resilience. Although research has shown that PsyCap is a higher order construct, suggesting that hope, optimism, self-efficacy and resilience are a relevant set of individual resources (Luthans and Youssef, 2004; Luthans et al., 2007) and that the four component resources load on the higher order core construct of PsyCap with convergent and discriminant validity (Luthans et al., 2010), the higher order of PsyCap has prevented researchers from fully exploring how employee-relevant PsyCap facilitates employee creativity. Moreover, previous research has never methodologically considered the hierarchy or the possible causal sequences among hope, optimism, self-efficacy and resilience. Nonetheless, from a developmental perspective, an employee who is entering the workplace for the first time might not yet have formed self-efficacy as a professional or experienced any setbacks in which they would need to exercise resilience. Consequently, considering the sequence of hope, optimism, self-efficacy...
and resilience in the workplace context, our study specifically focuses on the four different constructs of PsyCap in a specific order to explain the variation in employee creativity among individuals.

Hope and optimism as antecedents

Hope can be defined as an individual positive motivational state that is based on an interactively derived sense of successful agency (goal-directed energy) and pathways (planning to meet goals) (Snyder et al., 1991). Thus, a high hope employee has a positive psychological state of development in terms of persevering toward goals and, when necessary, redirecting his/her path to those goals in order to succeed (Luthans et al., 2010). In this context, people typically predict that they can achieve their goals by investing greater effort in their actions and behaviors. People with high hope are generally likely to invest more effort in accomplishing their goals because they are goal oriented. Hopeful employees act proactively and tend to be risk-takers when performing their work tasks. Drawing on Snyder’s (1994, 2000) hope theory, a high hope individual is one who proactively generates one or more pathways to goal accomplishment in a given situation. When high hope people face difficult obstacles, they may adopt a positive attitude and develop new methods and approaches for generating routes to reach their goals.

Furthermore, hopeful employees who encounter difficult obstacles tend to develop alternative ways, approaches, abilities or pathways for accomplishing a specific goal because they believe in their abilities, they recover well, and they resolve to overcome barriers. Roesch and Vaughn (2006) and Snyder et al. (1999) proposed that more hopeful employees exhibit greater self-efficacy and resilience. Hopeful employees are more likely to set challenging goals for themselves and self-select, which are regarded as mechanisms that contribute to self-efficacy and resilience. Avey et al. (2010) also suggested that employee hope is connected to self-efficacy. The authors argued that highly hopeful and efficacious employees share the characteristics of internalized motivation and energy or the positive expectation of success because they believe in their individual abilities (Avey et al., 2010). In light of the aforementioned reasoning, we argue that hope can be identified as an antecedent of employee self-efficacy and resilience. We therefore propose the following hypothesis:

H1. Hope is positively related to self-efficacy and resilience.

Optimism refers to the level of employees’ positive psychological state for making a positive attribution about success in the future (Luthans et al., 2010). Employees who are higher in optimism are likely to have higher resilience and self-efficacy compared to those with lower optimism for several reasons. Optimistic employees exhibit positive emotions regarding future expectations (Carver and Scheier, 2002), and Seligman (1998) showed that optimism has a significant and positive relationship with employees’ expected outcomes. Employees with a propensity for high optimism tend to be more confident when dealing with their tasks and jobs because they believe that they can take charge of their own destinies (Seligman, 1998). That is, individuals with a higher propensity for optimism are more likely to exhibit positive emotions (Snyder et al., 1991) because they feel more confident that they can accomplish their tasks and targets. Therefore, compared with a less optimistic employee, a highly optimistic employee performs more effectively on a wide range of jobs, especially those involving significant interactions with others. Indeed, optimistic employees have a propensity for learning new skills through more efficient means to achieve specific goals, and optimism tends to lead to more positive gains in cognition, coping and contextual resources that promote better mental health when employees face stressful events (Carver et al., 2010). Moreover, employees who possess higher levels of optimism are more likely to invest more active effort in their workplace than those with lower levels of optimism.
Furthermore, some previous studies have revealed significant associations between optimism and employee creativity. Sweetman et al. (2011) showed that a high level of optimism can directly relate to employee creativity. Li and Wu (2011) assumed that promotion optimism is more likely to contribute to creativity self-efficacy because people are eager to achieve success. Consequently, optimistic employees will generally tend have expectations regarding positive outcomes and are therefore more likely have higher levels of self-efficacy and resilience in terms of their emotions and motivation than less optimistic employees. Thus, compared to less optimistic employees, optimistic employees who expect success in their endeavors are more likely to have high levels of self-efficacy and resilience which in turn significantly predict individual positive emotions and expectations in the workplace. In accordance with these arguments, the following hypothesis is proposed:

\[ H2. \text{ Optimism is positively related to self-efficacy and resilience.} \]

**Mediating role of employee self-efficacy and resilience**

We argue that to better understand the predictors of employee creativity in the workplace, it is important to investigate the links between employee resilience and self-efficacy and optimism and hope in improving employee creativity. That is, we examine how hope and optimism, as two antecedences of psychological resources, may simultaneously drive self-efficacy and resilience and enable employees engage in creative activities. We thus explain how the two types of psychological resources positively impact employee creativity in work and work tasks via two hypothesized mediators: self-efficacy and resilience.

We believe that employees’ psychological resources, acquired through optimism and hope, are likely to enhance their positive emotions in their workplace for two reasons. First, according to the componential theory of creativity (Amabile, 1996), employees’ creative resources derive from intrinsic motivation to engage in activities due to interest, enjoyment, or a personal sense of challenge as well as their hope and optimism about being able to address future challenges. Thus, employees with higher levels of hope and optimism as motivation will experience more positive emotions and higher expectations regarding outcomes. Second, employees who possess high self-efficacy will tend to recognize and believe in the process and results of applying one’s personal abilities to achieve positive outcomes (Luthans et al., 2010). Therefore, we argue that compared to employees with low creative self-efficacy, employees who are high in creative self-efficacy may set higher creativity goals for themselves, as those who are high in self-efficacy are more likely to engage in innovative thinking. In addition to self-efficacy, psychological resilience can be viewed as an important resource reservoir that helps individuals manage continually changing situations (Taylor et al., 2000; Waugh et al., 2008). Resilient employees tend to adopt zestful and energetic approaches to life, are curious and open to new experiences (Tugade et al., 2004) and are flexible, intuitive, innovative, independent, skilled and confident (O’Malley, 2010). Therefore, we argue that self-efficacy and resilience are particularly relevant in this regard because they may relate to both intrinsic motivation and novel thinking. Moreover, self-efficacy and resilience may influence employees’ willingness to solicit and use positive feedback to improve their behavior and creativity.

Building on the discussion above, we expect that employees’ perceived self-efficacy and resilience triggered by hope and optimism will be directly related to their creativity. The componential theory of creativity (Amabile, 1985, 1988, 2013) suggests that individuals tend to use their intrinsic motivation and creativity-relevant processes as a source of employee creativity in the work context. Thus, employees with high levels of self-efficacy and resilience are likely believe that their feelings of hope and optimism will aid them in accomplishing specific tasks. Since self-efficacy is based on generative capability through the use of inventiveness and resourcefulness (Bandura, 1986), employees tend to believe that...
their individual perceived abilities will help them accomplish tasks (Bandura, 1997). Resilience enables individuals to not only recover from hardship but also persevere in the face of change and the need for creative problem solving (Luthans et al., 2007). Subsequently, employee creativity tends to be affected by resilience and self-efficacy. Therefore, we hypothesize that resilience and self-efficacy mediate the effects of hope and optimism on employee creativity:

H3. Self-efficacy mediates the relationship among hope, optimism and employee creativity.

H4. Resilience mediates the relationship among hope, optimism and employee creativity.

Employee self-efficacy and creativity
Employee self-efficacy refers to having the confidence to invest the necessary effort in succeeding at challenging tasks (Luthans et al., 2010). People who possess self-efficacy are likely to take on challenging tasks and endeavors, invest effort and motivational resources to achieve their goals, and adopt positive attitudes toward overcoming obstacles and difficulties (Luthans, 2002; Luthans and Youssef, 2004). Therefore, once an action has been taken, people with high self-efficacy may invest more effort and persist longer than those with low self-efficacy (Schwarzer, 2014). As a consequence, employees with high self-efficacy are likely to believe that their abilities position them to effectively execute and accomplish a given task. Thus, employees who are high in self-efficacy are more likely than those with low self-efficacy to learn by observing and thereby improve their ability to accomplish their goals (Bandura, 1997).

Along similar lines, research has argued that highly self-efficacious employees are more likely to seek new and useful ideas to achieve specific goals (Rego et al., 2012), and such self-efficacious employees are likely to be creative (Choi, 2004; Tierney and Farmer, 2004). Thus, employees high in self-efficacy have motivational and cognitive resources and are therefore likely to engage in a greater degree of creativity in their workplace than employees low in self-efficacy. Accordingly, we propose the following hypothesis:

H5. Self-efficacy is positively related to employee creativity.

Employee resilience and creativity
Resilience refers the ability to sustain and bounce back, and even beyond, when beset by problems and adversity (Luthans et al., 2007). Specifically, resilience is a blend of cognitive and emotional aspects, and employees who possess high resilience are likely to effectively employ their available assets (e.g. cognitive, affective, social, financial, and other positive characteristics, skills and resources) to mitigate the impact of risk factors (e.g. weaknesses, deficiencies and other negative factors that have the potential to amplify setbacks) (Masten and Reed, 2002). Thus, resilience is generally activated in response to a setback and motivates employee endurance in the face of obstacles. Indeed, an employee’s ability to “bounce back” from adversity or even dramatic positive changes is particularly relevant in today’s turbulent business environment (Luthans et al., 2004). Tugade and Fredrickson (2004) found that resilient employees have the ability to recover from negative stress and events and avoid stressful experiences in an effective way. Employees high in resilience may be more easily able to cope with stressful events, stressors and setbacks (Masten and Reed, 2002) and do not experience negative repercussions as strongly as employees with low resilience. In short, employees’ psychological resilience is a useful means of helping employees overcome the challenges they confront during organizational change, thereby enhancing their commitment to the change and their display of favorable change-related behaviors (Shin et al., 2012).
Resilient people tend to proactively prepare for hardships and minimize the impact of stressful events on themselves by using their psychological resources effectively (Fredrickson et al., 2008). Furthermore, resilient employees are able to overcome, steer through, bounce back and reach out to pursue new knowledge and experiences and deeper relationships with others and to find useful meaning in work and life (Luthans et al., 2007). Subsequently, a number of scholars have argued that employees with high levels of resilience have greater psychological resources, which can enhance employee creativity (Cohler, 1987; Helson, 1999). Extending these findings to the context of employee resilience, we argue that employees high in psychological resilience, compared to those low in resilience, will respond more favorably to change by using their resilience as a psychological resource. Thus, we propose the following hypothesis:

\[ H6. \text{Resilience is positively related to employee creativity.} \]

**Methodology**

**Sample and procedure**

We designed the following three procedures to identify our sample and collect our empirical data: we conducted interviews with senior managers of two to five business units in five manufacturing firms to identify relations between PsyCap and creativity; we administered a survey to a stratified random sample of 20–50 employees at different hierarchical levels in each business unit (identified using a random number generator and employee rosters); and we identified managers and their employees who directly engage in creative activities to improve their operational routines and efficiency in the workplace, and we invited these managers and employees to participate in our survey via a paper questionnaire or an e-mailed link to a web-based survey. A total of 700 managers and employees participated in our survey, and 232 incomplete responses and missing responses were removed from the sample. A total of 468 employees from 20 business units in the twenty manufacturing firms completed our survey, yielding a response rate of 66.85 percent. Furthermore, because the participants were Chinese, we invited two bilingual Chinese scholars to participate in our item development and questionnaire design process. We first translated all items from the original English to Chinese, and a second translator independently back-translated them to English. Both translators discussed inconsistencies and syntax differences between the original and the back-translated versions. Finally, two bilingual Chinese scholars discussed and adjusted the differences until they reached agreement on a final version.

**Measurement**

All constructs were measured with multi-item scales, and all corresponding items required seven-point Likert-style responses. In our study, all measure scales relied on the existing literature.

*The psychological capital of employees.* To measure employee PsyCap, we used a 24-item scale developed in previous studies (Luthans et al., 2007) that can be divided into four subscales, namely, hope, optimism, resilience and self-efficacy. Specifically, our measurement of PsyCap consists of six items drawn from the literature.

*Hope.* The six-item scale developed by Snyder et al. (1996) was used to assess employees’ psychological hope. Two items were removed based on the results of the statistical analysis.

*Optimism.* To measure employee optimism, the six-item employee scale developed by Scheier and Carver (1985) was used. According to the results of the statistical analysis, three items were deleted due to low factor loadings.

*Resilience.* To assess employee resilience, the six-item scale developed by Wagnild and Young (1993) was used. According to the results of the statistical analysis, three items were deleted.
Self-efficacy. To assess employee self-efficacy, we adopted the six-item scale developed by Parker (1998). According to the results of the statistical analysis, two items were deleted. In total, the PsyCap instrument in this study incorporated 14 items from previous studies.

Employee creativity. It refers to the extent to which an individual employee develops and applies new ideas and methods regarding products, services or processes at work (Oldham and Cummings, 1996; Shalley, 1991). The seven-item scale developed by Gong et al. (2009) was used to capture employee creativity. To assess employee creativity, we employed five items after deleting two items. Because of the initial construct validation procedure, this study extracted the scales for the creativity construct by deleting items with a standardized factor loading below the 0.70 level. All the scales in this study demonstrated reliability alphas greater than 0.70.

Analyses
Cronbach’s α scale reliability values for the five focal constructs needed to be higher than the minimum acceptable level of 0.70 (Nunnally and Bernstein, 1994). Furthermore, since our data collection relied on self-administered questionnaires from individual firm employees, these measures may exhibit common method bias. To evaluate the potential for common method variance (CMV), we employed Harman’s single factor test (Podsakoff et al., 2003). A factor analysis of the dependent and independent variables obtained a factor solution that accounted for 69.47 percent of the total variance. The first factor explained only 17.67 percent of the variance. Thus, CMV did not threaten the validity of our empirical results because the first factor did not explain the majority of the variance, and a single factor did not emerge.

In this study, a structural equation modeling approach was used to analyze our data. We conducted a confirmatory factor analysis (CFA) to determine whether the five key measured variables (hope, optimism, resilience, self-efficacy and employee creativity) were distinct from one another. The results of the CFA suggested that our five-factor measurement model fit the data well (incremental fit index (IFI) = 0.95; Tucker–Lewis index (TLI) = 0.94; comparative fit index (CFI) = 0.95; and root mean square error of approximation (RMSEA) = 0.067). Subsequently, the structural model was tested according to the hypotheses above. For completeness, we then ran three competing models against the proposed model to provide further conceptual and statistical support for our proposed model.

Measurement model
In this study, we employed a 19-item, five-factor, covariance structure measurement model to estimate the goodness-of-fit statistics, discriminant validity and internal consistency of all constructs in the model. Thus, CFA was used to verify the convergent and discriminant validity of all measures. The CFA showed that all scale items loaded satisfactorily on the relevant latent variables. Table I reports the model fit statistics ($\chi^2 = 440.64$, df = 142, CFI = 0.95, IFI = 0.95, TLI = 0.94, RMSEA = 0.067). Accordingly, all of the scales used in our study formed adequate measurement models and thus provided evidence for the construct validity of the measures. In addition, to estimate construct convergent and discriminant validity, Fornell and Larcker’s (1981) approach were employed to assess our measurement model. Convergent and discriminant validity were demonstrated by a series of t-statistics representing the items and their latent constructs, all of which are shown in Table II. The results are shown in Table I and indicate that the measurement model met both the convergent and discriminant validity criteria for all constructs.

In addition, we estimated the construct reliability for our measurement model, as shown in Table II. The results showed that the construct reliability for our measurement variables ranged from 0.80 to 0.93, indicating that all values were greater than the standard
requirement of 0.70. According to Table II, we also estimated the discriminant validity of each construct and found that all average variances extracted were larger than the squared correlations between the construct and all the other variables.

Structural model results
The corresponding hypotheses were examined using structural equation modeling via AMOS v20. The structural model was used to assess the validity of the causal structures among the latent variables. The structural model is shown in Figure 1.

We estimated the full model of the hypothesized relationships to test our hypotheses. Table III presents the empirical estimates for the structural model depicted in Figure 1 above. Similar to the measurement model, the goodness-of-fit statistics for the model were excellent ($\chi^2 = 3.082$, df = 143, CFI = 0.95, IFI = 0.95, TLI = 0.94, RMSEA = 0.067). All paths listed in Table III were evaluated to test our hypotheses and their significance. The relationships between hope and both self-efficacy and resilience were significant ($\beta = 0.297$)
and 0.113, respectively). Similarly, the relationship between optimism and self-efficacy was significant ($\beta = 0.444$), but the relationship between optimism and resilience was nonsignificant. Similarly, resilience significantly influenced employee creativity ($\beta = 0.87$), but self-efficacy did not significantly influence employee creativity. In our empirical model, we unexpectedly found that both hope and optimism had positive and significant effects on employee creativity ($\beta = 0.283$ and 0.222, respectively).

To estimate the mediating roles of self-efficacy and resilience on hope and optimism, we followed the approach employed by Baron and Kenny (1986). According to Baron and Kenny, full mediation exists when the direct relationships from hope and optimism to employee creativity are insignificant and the indirect relationships from hope and optimism through self-efficacy and resilience are significant. Moreover, partial mediation may exist when the direct relationship between both hope and optimism and employee creativity is significant and the indirect relationships between both hope and optimism and employee creativity are significant.

The results of the mediation estimates are summarized in Table IV. We estimated the mediating effects according to Baron and Kenny’s (1986) suggested procedures. Resilience

<table>
<thead>
<tr>
<th>Path</th>
<th>Hypothesized direction</th>
<th>Estimate</th>
<th>SE</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hope $\rightarrow$ Efficacious</td>
<td>+</td>
<td>0.297</td>
<td>0.064</td>
<td>4.047</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hope $\rightarrow$ Resilience</td>
<td>+</td>
<td>0.25</td>
<td>0.113</td>
<td>3.148</td>
<td>&lt; 0.005</td>
</tr>
<tr>
<td>Optimism $\rightarrow$ Efficacious</td>
<td>+</td>
<td>0.444</td>
<td>0.071</td>
<td>5.601</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Optimism $\rightarrow$ Resilience</td>
<td>+</td>
<td>0.131</td>
<td>0.118</td>
<td>1.617</td>
<td>0.106</td>
</tr>
<tr>
<td>Efficacious $\rightarrow$ Creativity</td>
<td>+</td>
<td>-0.057</td>
<td>0.082</td>
<td>-0.698</td>
<td>0.488</td>
</tr>
<tr>
<td>Resilience $\rightarrow$ Creativity</td>
<td>+</td>
<td>0.38</td>
<td>0.036</td>
<td>10.743</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hope $\rightarrow$ Creativity</td>
<td>+</td>
<td>0.283</td>
<td>0.081</td>
<td>3.497</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Optimism $\rightarrow$ Creativity</td>
<td>+</td>
<td>0.222</td>
<td>0.091</td>
<td>2.435</td>
<td>&lt; 0.005</td>
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<th>Partial mediation</th>
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<td>Efficacious</td>
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<td>X</td>
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<td>Hope $\rightarrow$ Creativity</td>
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<td>X</td>
</tr>
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</table>

Notes: Goodness-of-fit for the model: goodness-of-fit = 0.91, comparative fit index = 0.95, incremental fit index = 0.95, Tucker–Lewis index = 0.94, root mean square error of approximation = 0.067
appeared to play a partial mediating role. The direct relationship between both hope and optimism and employee creativity was significant when the resilience mediator was added. Furthermore, the indirect relationships through resilience were significant. Thus, Table IV suggests that resilience had a partial mediating role.

### Comparison of the competing models

By testing competing models in a single study, researchers can develop a clearer understanding of the conditions under which specific models are appropriate (Becker, 2009; Viswesvaran and Ones, 1995). This approach is particularly relevant to the current study, as no previous studies have included all the constructs of interest. Thus, in this study, we developed two competing models that allowed us to investigate the relationships between different constructs and extract the most appropriate statistical approach for testing our theories. To analyze the role of PsyCap in employee creativity, each of the two competing models was tested using structural equation modeling by comparing a series of nested models (James et al., 2006). The proposed model was compared with the competing models based on the concept of nested models and using the $F$-ratio (James et al., 1982; Rigdon, 1999). We used the $F$-ratio to estimate the competing nested structural model because our two competing models were considered nested, and both were subsets of our proposed model. Thus, in this study, two competing models were used to analyze which model produced a better fit. Both models showed a good fit to the data and thus met the conditions for inspecting the path models.

Our first competing nested structural model assumed that only optimism is an antecedent factor and that it not only directly drives employee creativity but also indirectly drives employee creativity through self-efficacy and resilience and that self-efficacy and resilience play mediating roles. The second competing nested structural model depicted a different antecedent factor. Here, we assumed that hope is the only antecedent factor driving self-efficacy and resilience in generating employee creativity and that self-efficacy and resilience mediate the relation between hope and employee creativity. As presented in Table V, the fit indices of the competing models are within the target values.

Empirically, measuring different competing models in a single study can help us develop a clearer understanding of the conditions under which specific models will hold. As shown in Table V, the fit indices indicated the competing models fit as well as the proposed model. The CFI, IFI and TLI values were slightly larger in the competing models, which indicate that the competing models offered a better fit; however, the proposed model had a slightly smaller RMSEA, and based on this, the proposed model fit better. Competing Model 1 (optimism as an antecedent) had the smallest Akaike information criterion, but the proposed

<table>
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<th>Proposed Model</th>
<th>Competing Model 1</th>
<th>Competing Model 2</th>
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<tr>
<td>$\chi^2$</td>
<td>440.66</td>
<td>278.95</td>
</tr>
<tr>
<td>df</td>
<td>143</td>
<td>85</td>
</tr>
<tr>
<td>No. of estimated parameters</td>
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<td>35</td>
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<td>Comparative fit index (CFI)</td>
<td>0.95</td>
<td>0.96</td>
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<tr>
<td>Incremental fit index (IFI)</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Tucker–Lewis index (TLI)</td>
<td>0.94</td>
<td>0.95</td>
</tr>
<tr>
<td>Root mean square error of approximation (RMSEA)</td>
<td>0.067</td>
<td>0.070</td>
</tr>
<tr>
<td>Akaike information criterion</td>
<td>543.66</td>
<td>348.95</td>
</tr>
<tr>
<td>$\chi^2$/df</td>
<td>3.082</td>
<td>3.282</td>
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<td>$F$-ratios between models</td>
<td>4.106</td>
<td>3.398</td>
</tr>
<tr>
<td>$p$-value</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table V. The fit indices of the competing models
model had the smallest $\chi^2/df$ ratio. Nonetheless, since the competing models were nested, the traditional criteria indicating that a model with higher goodness-of-fit statistics, a smaller Akaike information criterion, and a smaller $\chi^2/df$ is considered superior are no longer applicable. This is done to decide whether a more complex model is “better” at predicting the data than a simpler one by testing whether the residual sum of squares from fitting the simple model is significantly larger than that of the more complex model. The null hypothesis is that the simpler model is correct and will be rejected if $F$ satisfies $1 - \text{CDF}(F) < \alpha$, where CDF is the cumulative F-distribution function evaluated at $F$, and $\alpha$ is some maximum tolerable probability of Type I error. Based on the results of the $F$-ratios, the proposed model fit the data better than the competing models since both of the $p$-values were significant.

Discussion and contribution
Despite the large number of studies on the determinants of PsyCap, little conclusive evidence has been reported regarding the theoretical coherence of the “black box” of PsyCap in exploring the PsyCap-employee creativity relationship in human resources management. That is, how the four distinct PsyCap components work systematically and are structured to contribute to employee creativity. Our results resonate with prior empirical studies that have proposed that the four distinct PsyCap components may not make equivalent contributions to explaining a specific behavior or outcome (e.g. Madrid et al., 2018). Based on previous studies and our study findings, we argue that the four subdimensions of PsyCap may have a particular causal sequence, reflecting the fact that various psychological resources drive employee creativity differently.

In our work, we proposed a more specific conceptualization of PsyCap and tested models of the initial framework to link employee PsyCap and employee creativity. In examining our proposed framework, we found that both the hope and optimism components of PsyCap have a direct and strong association with creativity. However, based on our model, we unexpectedly discovered that self-efficacy does not directly contribute to employee creativity. Specifically, hope, self-efficacy, resilience and optimism contribute differently to explaining and predicting employee creativity. Among the four components, hope has a relatively strong influence on creativity, while only resilience mediates the effect of hope and optimism on creativity. The findings have both theoretical and practical implications.

Theoretically, previous studies on positive psychological resources have identified hope, optimism, self-efficacy and resilience (Luthans and Youssef, 2004; Luthans et al., 2004) as important facets of PsyCap. However, the few recent efforts to investigate the effect of PsyCap on creativity focused on the general PsyCap construct and thus lost sight of the effects of the important components of PsyCap. Zubair and Kamal (2015) argued that psychological resource theory emphasizes the necessity to treat individual resources as manifestations of an underlying core construct or an integrated resource set rather than isolated components to reflect that the resources are interactive and synergistic (Cozzarelli, 1993; Rini et al., 1999). However, this conceptualization neglects that the focus of positive organizational behavior is “state-like” or open to development (Youssef and Luthans, 2007; Luthans et al., 2007). The proposed model in this study attempted to adopt developmental considerations and reflected the fact that employees come to workplace initially with hope and optimism developed in an earlier stage of life and then develop self-efficacy and resilience in response to situations, interventions or stressors. This conceptualization is in accordance with evidence from the educational setting indicating that trait hope predicts both academic self-efficacy (Feldman and Kubota, 2015) and that hope and academic optimism predict perceived success, which in turn predicts teaching self-efficacy (Sezgin and Erdogan, 2015). The results of our study are consistent with these studies.
In addition, previous studies on the relationship between PsyCap and creativity used composite scales to measure PsyCap in order to employ the score in regression analysis. However, methodological measurement errors were inherently ignored in the analyses. In this study, we utilized structural equation modeling so that all the constructs were treated as latent variables, and possible measurement errors were specified and modeled in the proposed model.

Our model shows that hope, optimism and resilience all have a direct effect on creativity, but interestingly, self-efficacy does not have a significant effect on creativity. One reasonable explanation for this is that self-efficacy relates to individual convictions or confidence in one’s abilities to mobilize the motivation, cognitive resources and courses of action needed to successfully execute a specific task within a given context (Stajkovic and Luthans, 1998). A self-efficacious person might rely more on existing motivation and resources or course of actions that have proven to be effective to guarantee success instead of depending on creativity or creative behavior. Meanwhile, since resilience is the positive psychological capacity to rebound from adversity, uncertainty, conflict and failure (Luthans, 2002), rebounding from unfavorable conditions requires a positive assessment of risks and personal assets (Luthans et al., 2006), such as a risk-taking orientation and a willingness to adapt and be flexible, which therefore leads to creativity. The focus of the differentiated effect of individual facets of PsyCap reveals aspects that we might not otherwise understand regarding how psychological resources affect the creativity of employees.

The findings also have practical implications. In the context of automated machines, robots and artificial intelligence are considered possible threats to replace human roles at work, and creativity has been regarded as an area that still favors humans. The key to enhancing creativity is to increase the levels of employees’ hope, optimism and resilience. Managers who seek to promote creativity as a competitive advantage for an organization can make use of psychological assessments for selection and recruitment and consider coaching or mentoring programs aimed at developing a sense of hope and optimism and the ability to cope with adversity and frustration at work.

**Limitations and future research**

Our study has several potential limitations that should be noted. First, this study focused only on individual employee levels to measure PsyCap and employee creativity. Employee creativity was measured through self-report surveys, which may not reflect the employees’ actual creative outcomes. Thus, future research could use more objective evaluations of employee creativity, such as ratings from supervisors or peer evaluations. Second, our data were collected through one-wave surveys, and there were statistically significant differences between PsyCap and the employee creativity outcomes. However, our data collection was based on one period, and time-lagged data collection for variables may obtain better reliability for the measures. Moreover, future studies could use a two-wave design for data collection and encourage respondents to answer the questions as honestly as possible by assuring their confidentiality, thereby enhancing the consistency of the findings. Third, although we presented theoretical arguments and statistical evidence indicating that four distinct PsyCap components have different effects on employee creativity, the causal mechanisms by which PsyCap results in employee creativity should be interpreted with caution. Future research could address other variables that might mediate the relationship between PsyCap and employee creativity outcomes. Potential mediating variables, such as employee engagement, may affect employee creativity. A comparison of PsyCap with employee engagement in predicting employee creativity would help in understanding the relative strength of positive PsyCap. Finally, future research could examine employee innovation ability as an outcome variable and identify the circumstances under which the relationship between PsyCap and employee innovation become stronger or weaker.
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**Further reading**


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How and when environmental regulation induces middle managers’ proactive behavior

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Abstract

Purpose – The purpose of this paper is to explore how middle managers respond to the career challenges caused by environmental regulation. In particular, this paper examines whether environmental regulation strength is positively related to middle managers’ openness toward change, and whether middle managers’ openness toward change is positively related to proactive behavior. Furthermore, the moderating role of top managers’ bottom-line mentality in these two relationships is examined.

Design/methodology/approach – Cross-sectional survey research (n = 155) was conducted. During a training program, data were collected from 155 middle managers from a listed company that manufactures primary products. With these data the authors examined the main relationship and also explored the moderating effect of top managers’ bottom-line mentality.

Findings – Analysis of the findings indicates that perceived environmental regulation strength influences middle managers’ openness toward change and consequently their proactive behavior. In addition, top managers’ bottom-line mentality moderates both the link between environmental regulation strength and openness toward change and the link between openness toward change and proactive behavior.

Originality/value – The findings of this study reveal how environmental regulation induces middle managers’ proactive behavior, and the influence of top managers’ mentality on how middle managers respond to environmental regulation both cognitively and behaviorally.

Keywords Proactive behaviour, Environmental regulation, Openness towards change, Top managers’ bottom-line mentality

Paper type Research paper

Introduction

Environmental regulation poses challenges not only to organizations but also to employees. Environmental regulation expresses governments’ environmental concerns and is intended to force firms to consider environmental issues (Rugman and Verbeke, 1998). To meet environmental standards, organizations may have to adopt environmentally friendly technologies or limit the manufacturing of environmentally unfriendly products, both of which harm organizations’ competitive performance, at least in the short term (Cohen and Tubb, 2018; Iraldo et al., 2011). This poses a threat to employees’ careers. By sharing their joys and sorrows with organizations, employees become motivated to help organizations successfully adapt to environmental regulations. Meanwhile, organizations expect employees, especially middle managers, not only to work harder but also to engage in change-oriented behaviors (Griffin et al., 2010). This expectation arises because it is often the middle managers who have their hands on the “pulse of the organization” and are closest to customers and manufacturing. Their roles often give them knowledge of the changes that can bring the organization into conformance with environmental regulations (Ocasio et al., 2018). By proposing new ideas and initiating and executing changes, middle managers not only help their firms adapt to new environmental regulations, but also help themselves overcome specific challenges to their positions, and even transform such challenges into opportunities that advance their own careers. For example, such middle managers may be delegated to...
implement their proposed ideas, creating the context for their own promotion. Thus, we ask how and when environmental regulation leads to middle managers’ proactive behavior.

Social information processing theory suggests that the social environment influences individuals’ attitudes and opinions, which, in turn, guide individual behavior (Salancik and Pfeil, 1978). This theory suggests that attitude is an important mediator of the relationship between environmental regulation and middle managers’ proactive behavior. Here, openness is conceptualized as support for change, positive affect toward the potential consequences of change, and a necessary and initial condition for change (Covin and Slevin, 1990). Drawing on social information processing theory, we infer that middle managers’ openness toward change mediates the relationship between environmental regulation and middle managers’ proactive behavior.

Top managers serve as information providers in areas beyond environmental regulation, with their opinions providing a schema that may increase or decrease the salience of environmental cues (Chin et al., 2016), thus influencing the effect of environmental regulation on middle managers’ attitudes and the consistency between their attitudes and behavior. When faced with a conflict between environmental regulation and profit goals, top managers differ in their commitment to the latter (Dowell and Muthulingam, 2017). In other words, top managers can be described by the extent to which they adopt a bottom-line mentality, defined by its asymmetrical emphasis on profit over the environment. We further infer that top managers’ bottom-line mentality moderates both the relationship between environmental regulation and middle managers’ openness toward change and the relationship between openness toward change and proactive behavior.

In this study, we contribute to the literature on both environmental regulation and proactivity. First, by examining middle managers’ attitude toward change and their proactive behavior, we reveal how environmental regulation induces change within organizations. Research on environmental regulation has mainly focused on organizational responses to environmental regulation, finding that environmental regulation causes organizational change (Cennamo et al., 2012). However, how organizational change takes place within organizations remains unknown. Considering middle managers’ pivotal role in detecting new ideas and in initiating and undertaking change, it is necessary to examine their response to environmental regulation and the mechanism underlying that response.

Second, regarding the proactivity literature, we suggest that a stressful environment can foster proactive behavior. Research has highlighted that a stressful environment impedes proactive behavior; however, several studies have implied that stressful environment has different effects. For example, negative emotions can activate proactive behavior (Parker et al., 2019), and contradiction may inspire learning, creativity, and discovery (Smith and Lewis, 2011). These studies, based on intra-personal or intra-organizational evidence, have suggested that stress positively affects individual proactivity. Our study, based on external environmental evidence, suggests that environmental factors, particularly stress, positively affect proactive behavior.

Finally, we examine the moderating role of top managers’ mentality, and reveal its influence on how middle managers respond to environmental regulation both cognitively and behaviorally. Much research has identified that top managers’ strong support and commitment are key factors affecting organizational environmental behavior (Zhang et al., 2018; Gattiker and Carter, 2010) because top managers are responsible for organizational decisions. Additionally, top managers’ mentality influences middle managers’ cognitive and behavioral responses to environmental change. Our examination of the moderating role of top manager’s bottom-line mentality provides evidence of their indirect influence on organizational responses to environmental regulation.

Literature review
The influence of environmental regulation on firms is well established. Scholars have discussed the links between environmental regulation and organizational outcomes such as...
competitiveness (Dowell and Muthulingam, 2017; Iraldo et al., 2011), financial performance (Alexopoulos et al., 2018), and corporate environmental behavior (Lee and Lounsbury, 2015; Pan et al., 2011; Wang et al., 2015). The generally accepted conclusion is that organizations must undergo necessary change and adopt commonly accepted structures and operational methods to obtain organizational legitimacy, and may even strive to improve competitiveness by maximizing the opportunities that emerge from environmental regulation (Porter and van der Linde, 1995; Rubashkina et al., 2015). However, how to facilitate intra-organizational change that enhances legitimacy and improves competitiveness remains unknown (Delmas and Toffel, 2008). Delmas and Toffel (2008) suggested examining the black box of the interaction between organizations’ internal constituents and the external environment, and they specifically examined the interaction between influential corporate departments and the external environment. Nevertheless, more research is needed to explain the intra-organizational mechanism by which environmental regulation produces change.

In general, there is increased interest in identifying the antecedent conditions that inform managerial efforts to encourage employee proactivity, responsibility, and initiative (Grant and Ashford, 2008). However, most studies have understood the drivers of proactive behaviors in terms of individual-level differences such as personality (Lian et al., 2014) and self-efficacy (Morrison and Phelps, 1999) and in terms of internal conditions such as leadership (Wu and Parker, 2014) and career state. Less research attention has been paid to aspects of the external environment that may encourage such behaviors. Recognizing this limitation, Griffin et al. (2007) and Grant and Ashford (2008) suggested that research is needed to examine how work context influences change-oriented behaviors, including proactive behavior. In contrast, this study links environmental regulation to middle managers’ proactive behavior, and aims to examine the external antecedents and underlying mechanism of influence.

Finally, regarding the role of top managers, many studies have shown that their strong support and commitment are key factors affecting corporate environmental behavior (Zhang et al., 2018; Gattiker and Carter, 2010). Chin and Pun (1999) indicated that the commitment of top management is a decisive factor affecting the implementation of ISO 14001 in the printed circuit board industry in Hong Kong. While considerable research has focused on top managers’ direct effects on organizational responses to environmental regulation, less research has examined their indirect influence on the link between environmental regulation and organizational response.

Of various attitudinal variables of top managers, bottom-line mentality is the focus of this study. Top managers differ in their priorities when attempting to resolve the contradiction between profitability and the environment. Some may consider environmental regulation as a means of gaining legitimacy, while others may adhere to the goal of profitability (Chin et al., 2018). The term “bottom line” is informally defined as “profits or losses, as of a business” (Webster’s New World College Dictionary, 2000, p. 172). It refers to whatever “is worth paying attention to while everything else is discarded” (p. 145). Given top managers’ influence over middle managers, we examine the interactive effect of environmental regulation and top managers’ bottom-line mentality on middle managers’ cognitive and behavioral response to environmental regulation. We propose that when top managers’ bottom-line mentality expresses norms that are contrary to environmental regulation, the effect of environmental regulation on middle managers weakens.

**Theory and hypotheses**

**Environmental regulation, openness toward change, and proactive behavior**

Social information processing theory is premised on the idea that the social context exerts two general effects on individual attitude: the social environment provides information
about what a person’s attitudes and opinions should be (Salancik and Pfef, 1978); and the social environment focuses an individual’s attention on certain kinds of information, making that information more salient and setting expectations for individual behavior, which includes defining the logical consequences of meeting or failing to meet those expectations. The social environment, by affecting attitude in the manner described above, gives individual cues as to expectations for the workplace. Furthermore, the dimensions made salient can then affect attitude (Salancik and Pfef, 1978).

We examine perceptions of environmental regulation. The perceived strength of environmental regulation potentially shapes middle managers’ attitudes and guides their attention. Drawing on social information processing theory, we infer that environmental regulation can lead middle managers to become more open to change, specifically because environmental regulation cues middle managers on expectations of change and the necessity of change. Strong environmental regulation signals that past practices are no longer acceptable and stipulates the requirements for meeting the new standards. For middle managers whose departments are directly involved in environmental regulation, such as manufacturing departments, strong environmental regulation forces them to be aware of the gap between current practice and expected practice, with such a gap representing, for example, the distance between a firm’s current technology and that of the new environmental requirement. For middle managers from non-manufacturing departments, despite the lack of their direct involvement in environmental regulation, the challenges may include reduced budgets and redirected strategies, pressuring them to adapt to the new intra-organizational environment. Overall, strong environmental regulation cues middle managers that change is expected and legitimate.

Additionally, environmental regulation conveys the necessity of change by focusing middle managers’ attention on the expectations of supervisors in environmental departments and on the logical consequences of their organizations’ behavior. Middle managers, with their interest in a regular salary and job security, are influenced by the organization’s prospects. Thus, the information delivered through environmental regulation induces middle managers to think about helping the organization conform to the new regulations and avoid the logical consequences of punishment or other negative events. Through the two effects described above, environmental regulation primes middle managers to recognize the need for change. In this case, the stronger the environmental regulation, the more clearly and saliently middle managers perceive that need for change. As a result, environmental regulation increases middle managers’ openness toward change. Based on the discussion above, we propose the following hypothesis:

H1. Environmental regulation strength is positively related to middle managers’ openness toward change.

Crant (2000) broadly defined proactive behavior as “taking initiative in improving current circumstances or creating new ones; it involves challenging the status quo rather than passively adapting to current conditions” (p. 436). Proactivity is characterized by behavior aimed at taking control of situations, that is, by action and change (Crant, 2000). General forms of proactive behavior include actively seeking out information, identifying room for improvement, making constructive change-oriented suggestions and taking steps to improve a situation.

We expect that openness toward change is positively related to proactive behavior. A number of researchers have suggested that proactive behavior is likely to emerge from the positive attitude related to change (Parker et al., 2006). For example, Parker et al. (2006) found that a change-orientation predicts proactive behavior. Fuller et al. (2006) indicated that individuals who feel responsible for constructive change engage in proactive behavior because it motivates them to more thoroughly analyze work process-related
information. Hetzner et al. (2012) suggested that people who are ready to change engage in personal initiative behavior. We suggest that openness toward change may be positively related to proactive behavior. A person who holds a favorable attitude toward an objective engages in behavior favorable to that objective, and declines to engage in unfavorable behavior. Managers who are open to change (i.e. have a liberal attitude toward change) should be willing to go beyond what is required, acquiring necessary knowledge and skills and modifying their work routines (Fay and Frese, 2001). Such managers are more likely to initiate, introduce, and undertake new departmental practices. In contrast, managers whose attitudes reflect a more conservative attitude toward change are likely to discourage significant change, being themselves reluctant to initiate new practices and resistant to that which challenges the status quo. Based on the discussion above, we propose the following hypothesis:

**H2.** Middle managers’ openness toward change is positively related to proactive behavior.

As mentioned, environmental regulation can cue middle managers to change their practices and strategies, and those who show openness toward change are likely to initiate practices that correspond to environmental regulation. Therefore, we propose that openness toward change mediates the relationship between environmental regulation and proactive behavior. Based on the discussion above, we propose the following hypothesis:

**H3.** Middle managers’ openness toward change mediates the positive relationship between environmental regulation strength and proactive behavior.

The moderating role of top managers’ bottom-line mentality

Beyond the context of environmental policy, other people can influence individual’s attitudes and opinions. In the workplace, top managers are the most important others, and their visibility within the organization (i.e. middle managers’ awareness of the top managers’ power and position), translates into influence over middle managers, which includes their ability to control middle managers’ resources (e.g. rewards, promotions, favorable work assignments) (Hickson et al., 1971; Salancik and Pfef, 1978). These contingencies of power compel middle managers to look to top managers for cues on the organization’s attitudinal and behavioral norms.

Top managers’ bottom-line mentality constrains their endorsement of a change repertoire. Top managers who adopt a one-dimensional frame of mind that revolves around bottom-line outcomes are apt to neglect competing organizational priorities including environmental requirements, a phenomenon known as a bottom-line mentality (Efraty and Wolfe, 1988). In the sole pursuit of profit, top managers pay little attention to whether their actions have an effect on environmental protection. Furthermore, when top managers adopt a bottom-line mentality, they run the risk of pursuing profit as if it were simply a game to be won (Efraty and Wolfe, 1988). Thus, securing the bottom line becomes the only strategy for a win, and any other outcome, including environmental protection, is considered a loss. As a result, top managers with a strong bottom-line mentality may only endorse proposals for change that enhance profitability, which limits their change repertoire.

We infer that the stronger top managers’ bottom-line mentality, the weaker the relationship between environmental regulation strength and middle managers’ openness toward change. This relationship emerges because top managers, with their limited change repertoires, provide cues that are contrary to environmental regulation, which may weaken the effect of such regulation. Although environmental regulation provides middle managers with cues that change is needed, the bottom-line mentality of top managers suggests to middle managers that it is appropriate to focus exclusively on profit and then behave accordingly. Then, middle managers may begin to consider environmental
regulation to be meaningless or even problematic. Furthermore, with top managers viewing pro-environmental plans as irrelevant or even as a loss, middle managers who propose and support such pro-environmental plans may become vulnerable to retaliation or punishment. As a result, although environmental regulation requires a change in middle managers’ practices and operations, the top managers’ emphasis on profit narrows the scope of middle managers’ attention to a limited range of practices and strategies. Consequently, middle managers may hold a negative attitude toward change, particularly toward change that does not yield profit.

In contrast, when top managers have a weak bottom-line mentality, they deliver cues that profitability and environmental protection are equally important and equally valued. Such norms and expectations encourage middle managers to develop a positive attitude toward change. Based on the discussion above, we propose the following hypothesis:

**H4.** Top managers’ bottom-line mentality moderates the relationship between environmental regulation strength and middle managers’ openness toward change, such that the stronger the leaders’ bottom-line mentality, the weaker the relationship between environmental regulation strength and middle managers’ openness toward change.

The theory of planned behavior (Ajzen, 1991) postulates three conceptually independent determinants of intention: attitude toward the behavior, which refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question; subjective norms, which refers to the perceived social pressure to perform or not to perform the behavior; and perceived behavioral control, which refers to the perceived ease or difficulty of performing the behavior and is assumed to reflect both past experience and anticipated challenges.

These three factors interactively influence individual behavior. More specifically, when an individual comes under social pressure, a positive attitude toward the proactive behavior induces more behavior. As previously mentioned, the attitude of openness toward change leads to proactive behavior. We infer that top managers’ bottom-line mentality negatively moderates such a relationship. When top managers have a strong bottom-line mentality, they provide cues that attaining the bottom-line is more important than protecting the environment (Efraty and Wolfe, 1988), and such top managers reward and punish employees in a manner that reinforces their bottom-line mentality. In these cases, middle managers find it especially difficult to advance environmental protection and can be expected to behave less proactively. Based on the discussion above, we propose the following hypothesis, and our theoretical model is shown in Figure 1:

**H5.** Top managers’ bottom-line mentality moderates the relationship between middle managers’ openness toward change and proactive behavior, such that the stronger the leaders’ bottom-line mentality, the weaker the relationship between middle managers’ openness toward change and proactive behavior.

![Figure 1. Theoretical model](443)
Methods

Sample and procedures
We collected data from a listed company that manufactures primary products, and the respondents were middle-level managers. We delivered our questionnaires during a training program. Each respondent received a questionnaire, a return envelope, and a cover letter that introduced the survey. To ensure confidentiality, the respondents were instructed to seal their completed questionnaires in the return envelopes and hand them directly to the researcher on site.

In total, 256 questionnaires were distributed. After eliminating responses with too much missing information (\( > 20 \) percent), there were 155 valid responses (response rate of 60.5 percent). In the remaining sample, 74 percent of the respondents were male, the mode of their level of education was undergraduate, and their average age was 47.71. The supervisors’ average tenure in their current organization was 15.85 years.

Measures
All of the response scales for the measure ranged from 1 = not at all/strongly disagree to 5 = always/strongly agree.

Environmental regulation strength. We used four items developed by Dutton et al. (1990) to measure middle managers’ perception of environmental regulation strength. A sample item is “You feel that environmental regulation is increasingly strict.” Cronbach’s \( \alpha \) was 0.69.

Openness toward change. We used the five-item scale developed by Miller et al. (1994) to measure middle managers’ openness toward change. A sample item is “the proposed changes in the work teams will be for the better.” Cronbach’s \( \alpha \) was 0.89.

Proactive behavior. A nine-item scale developed by Griffin et al. (2007) was used to measure middle managers’ proactive behavior. A sample item is “Improve the way your work unit does things.” Cronbach’s \( \alpha \) was 0.94.

Top manager’s bottom-line mentality. A four-item scale developed by Greenbaum et al. (2012) was used to measure the bottom-line mentality of the top manager. A sample item is “The top manager only cares about the business.” Cronbach’s \( \alpha \) was 0.91.

Control variables. Based on the literature on employees’ proactive behavior (Wu et al., 2018), we controlled for employees’ gender, age, education level, career tenure and organization tenure. Gender was coded as 0 for female and 1 for male. Education level was measured in four categories (1 = below associate’s degree, 2 = associate’s degree, 3 = Bachelor’s degree, 4 = Master’s degree or above).

Results
Table I presents the means, standard deviations (SDs), and zero-order correlations of the variables included in this study. Environmental regulation strength was positively correlated with openness toward change \( (r = 0.30, \ p < 0.01) \) and proactive behavior \( (r = 0.34, \ p < 0.01) \). In addition, openness toward change was positively correlated with proactive behavior \( (r = 0.76, \ p < 0.001) \). Following Fornell and Larcker (1981), we compared the square root of every construct’s AVE and correlations with the other constructs. All of the square roots of the latent variables were larger than the correlations, indicating the divergent validity of these latent variables. We conducted Harman’s test (Harrison et al., 1996) to test whether the common method bias is serious. The results indicate that common method only explained 40 percent variance of all of the items, and thus that common method bias is not serious.

We used ordinary least squares (OLS) regression to derive parameter estimates. Following Aiken and West (1991), we examined the moderating effects with the products of both top manager bottom-line mentality and environmental regulation strength, and middle
managers’ openness toward change and proactive behavior. We first mean centered the predictor variables to reduce potential multicollinearity. We included these two products in the models respectively. Table II summarizes the models tested in this study.

$H1$ suggests that environmental regulation strength is positively related to openness toward change. As shown in Table II, we first regress openness toward change on the control variables in Model 1, and none of the control variables are related to openness toward change. In Model 2, we add environmental regulation strength, which is positively related to openness toward change ($b = 0.29, p < 0.05$). Thus, $H1$ is supported.

$H2$ proposes that openness toward change is positively related to proactive behavior. Model 3 indicates that none of the control variables are related to proactive behavior. Model 5 shows that openness toward change is positively related to proactive behavior ($b = 0.70, p < 0.001$). Thus, $H2$ is supported.

$H3$ proposes that openness toward change mediates the relationship between environmental regulation strength and proactive behavior. To test this mediation effect, we first examine the relationship between environmental regulation and proactive behavior. Model 4 shows that environmental regulation is positively related to proactive behavior ($b = 0.34, p < 0.01$). Combined with the above results, the mediation effect is supported according to Baron and Kenny (1986). Furthermore, we use PROCESS execute bootstrapping to test this mediation effect. The results show that the mediation effect is supported ($b = 0.20, CI = (0.02, 0.46)$). Thus, $H3$ is supported.

$H4$ proposes that top managers’ bottom-line mentality buffers the relationship between environmental regulation strength and openness toward change. After controlling for environmental regulation strength and top managers’ bottom-line mentality (Model 6), in Model 7 we add the interaction of environmental regulation strength and top managers’ bottom-line mentality. The result shows that the moderating effect is significant ($b = -0.40, p < 0.01$). In addition, Delta $R^2$ is significant ($\Delta R^2 = 0.11, p < 0.01$). Thus, $H4$ is supported.

To better understand the nature of these interactions, we conducted simple slope analysis. We examined the simple slope depicting the relationship between environmental regulation strength and openness toward change at different values of the top manager bottom-line mentality (e.g. $\pm$ 1 SD from the mean) (Preacher et al., 2006). Figure 2 depicts the relationship between environmental regulation strength and openness toward change at low (1 SD below the mean) and high (1 SD above the mean) levels of top manager bottom-line mentality ($b_L = 0.77, p = 0.01$; $b_H = 0.11, p = 0.67$). This figure shows that the relationship between environmental regulation and openness toward change is stronger when top managers’ bottom-line mentality is high than when it is low. Thus, $H1$ was supported. That is, top managers’ bottom-line mentality moderates the relationship between environmental regulation and openness toward change.

<table>
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<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
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<th>3</th>
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<th>5</th>
<th>6</th>
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<td>2. Age</td>
<td>47.71</td>
<td>5.91</td>
<td>−0.34**</td>
<td>−</td>
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<tr>
<td>3. Education background</td>
<td>1.73</td>
<td>0.54</td>
<td>0.07</td>
<td>−0.19</td>
<td>−</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>4. Career tenure</td>
<td>17.01</td>
<td>11.77</td>
<td>−0.07</td>
<td>0.30**</td>
<td>−0.11</td>
<td>−</td>
<td></td>
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<tr>
<td>5. Organization tenure</td>
<td>15.85</td>
<td>11.21</td>
<td>0.03</td>
<td>0.14</td>
<td>0.04</td>
<td>−0.09</td>
<td>−</td>
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<tr>
<td>6. Environmental regulation strength</td>
<td>4.38</td>
<td>0.78</td>
<td>0.09</td>
<td>0.13</td>
<td>−0.11</td>
<td>−0.00</td>
<td>0.13</td>
<td>0.73</td>
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<tr>
<td>7. Openness toward change</td>
<td>4.43</td>
<td>0.74</td>
<td>0.07</td>
<td>0.11</td>
<td>−0.05</td>
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<td>−0.06</td>
<td>0.30**</td>
<td>0.84</td>
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<td>8. Top manager bottom-line mentality</td>
<td>2.68</td>
<td>1.10</td>
<td>−0.34**</td>
<td>0.38**</td>
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<td>9. Proactive behavior</td>
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<td>0.73</td>
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<td>0.07</td>
<td>−0.06</td>
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<td>−0.14</td>
<td>0.34**</td>
<td>0.76***</td>
<td>0.13</td>
<td>0.82</td>
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Notes: $n = 155$. Square roots of AVE are reported on the diagonal. **$p < 0.01$; ***$p < 0.001$
<table>
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<tr>
<th>Outcomes</th>
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<tr>
<td></td>
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<td>Education background</td>
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<tr>
<td>Career tenure</td>
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<td>−0.00</td>
</tr>
<tr>
<td>Organization tenure</td>
<td>−0.01</td>
<td>−0.01</td>
</tr>
<tr>
<td>Environmental regulation strength</td>
<td>0.34**</td>
<td>0.19*</td>
</tr>
<tr>
<td>Openness toward change</td>
<td></td>
<td></td>
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<tr>
<td>Top manager bottom-line mentality</td>
<td></td>
<td></td>
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<tr>
<td>Environmental regulation strength × top manager bottom-line mentality</td>
<td></td>
<td>−0.18*</td>
</tr>
<tr>
<td>Openness toward change × top manager bottom-line mentality</td>
<td></td>
<td></td>
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<tr>
<td>$F$</td>
<td>0.40</td>
<td>2.04+</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.03</td>
<td>0.15</td>
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<tr>
<td>Delta $R^2$</td>
<td>0.12**</td>
<td>0.64***</td>
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</table>

**Notes:** Non-standardized coefficients are reported. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
H5 proposes that top managers’ bottom-line mentality buffers the relationship between openness toward change and proactive behavior. After controlling for environmental regulation strength and top managers’ bottom-line mentality (Model 8), in Model 9 we add the interaction of openness toward change and top managers’ bottom-line mentality. The result shows that the moderating effect is significant ($b = -0.18, p < 0.05$). In addition, Delta $R^2$ is significant ($\Delta R^2 = 0.03, p < 0.05$). Thus, $H5$ is supported.

Figure 3 provides the same kinds of graphs for the moderating effect of top managers’ bottom-line mentality on the relationship between openness toward change and proactive behavior. As Figure 3 shows, a higher level of top managers’ bottom-line mentality resulted in a less positive relationship between openness toward change and proactive behavior.
As a result, the buffering effect of top managers’ bottom-line mentality on the relationship between openness toward change and proactive behavior predicted in H5 is fully supported.

Discussion

We conducted a field study to better understand how and when environmental regulation leads to middle managers’ proactive behavior. Drawing on social information processing theory, we hypothesized that perceived environmental regulation strength influences middle managers’ openness toward change, and that openness toward change consequently influences their proactive behavior. Furthermore, we posited that top managers’ bottom-line mentality moderates the relationship both between environmental regulation strength and openness toward change and between openness toward change and proactive behavior. All of our hypotheses are supported.

Theoretical implications

This paper makes several theoretical contributions. First, we reveal how employees cope with the career challenges caused by exogenous organizational factors such as environmental regulation. Environmental regulation is believed to pose threat not only to an organization’s competitiveness but also to employees’ job security. However, how employees respond to such external sources of job insecurity remains unknown. We found that middle managers’ proactive behavior was associated with environmental regulation through openness toward change, and that this mechanism was constrained by top managers’ bottom-line mentality. These findings extend our understanding of how employees respond to job insecurity resulting from exogenous organizational factors such as environmental regulation.

Focusing on the indirect effect of environmental regulation on middle managers’ proactive behavior through openness toward change, we reveal the intra-organizational mechanism of how environmental regulation influences organizations’ proactive response. Environmental regulation may enhance organizational performance in an efficiency-producing and innovation-stimulating relationship because it provides incentives to change companies’ production routines (technological or process innovation) in a way that leads to compliance and reduced costs through decreased resource inputs or increased efficiency. However, how environmental regulation’s positive effects foster proactive behaviors within organizations remains unknown. This effect is not automatic. Our findings indicate that the direction of causation runs from environmental regulation strength to openness toward change and to proactive behavior, which implies that external factors, in this case environmental regulation, can induce change in middle managers’ attitudes and reinforce the proactive behavior that fosters change in the organization as a whole.

In the proactive behavior literature we found that the stress of environmental regulation can facilitate rather than impede middle managers’ proactive behavior. Most studies have assumed that a stressful environment impedes proactive behavior because it lowers individuals’ confidence in the potential success of their own proactive behavior. Our finding suggests the need to differentiate between kinds of stressful environments. We found that environmental regulation strength is positively related to proactive behavior because it signals the necessity of initiating change. This implies that a stressful environment that encourages proactivity and change induces proactive behavior. As a result, our finding provides a better and more subtle understanding of when a stressful environment facilitates or impedes proactive behavior.

Finally, we found that the effect of environmental regulation is constrained by top managers’ mentality. We observed that when managers show a high level of bottom-line mentality, the positive relationship between environmental regulation is weakened, which implies that top managers play an indirect role in shaping middle managers’ attitude toward change. This finding complements previous research on top managers’ direct role in guiding
middle managers’ attitude toward environmental change (Chin et al., 2018). Furthermore, we found that top managers’ bottom-line mentality constrains middle managers’ ability to translate positive attitude into proactive behavior. This result indicates that the influence of top managers’ constrains the behavior of middle managers, regardless of their attitude. In a word, the moderating role of top managers’ bottom-line mentality shows the importance of top managers in constraining the effects of environmental regulation, thus providing indirect evidence of the view that top managers play a vital role in influencing organizational responses to environmental regulation.

Practical implications
Our findings suggest that middle managers’ attitude and behavior are vulnerable to external influences. Considering middle managers’ important role in proactively identifying new ideas and practices, and in initiating and implementing effective ways to help organizations adapt to a new environment, top managers should encourage middle managers’ exposure to external influences, especially environmental regulations. For example, top managers can regularly inform all middle managers of the latest environmental regulations. By doing so, organizations may adapt and even respond proactively to environmental regulation. In addition, middle managers should also pay attention to improving openness toward change so that they can further their careers.

However, our finding warns top managers about their overwhelming indirect influence on middle managers’ attitude and behavior. We found that even without direct persuasion or guidance, top managers’ bottom-line mentality restrains middle managers from initiating open and proactive responses to environmental regulation, which may constrain how organizations adapt to new environmental requirements. Thus, we suggest that top managers become aware of the degree to which their opinions and views influence others in the workplace. If top managers expect middle managers to openly and proactively respond to environmental change, then those top managers should express their interest in pursuing the bottom line with greater prudence and caution.

Environmental regulation poses a challenge not only to enterprises but also to employees, especially middle managers. How to conform to environmental regulations while maintaining profitability is relevant to the careers of both top and middle managers. If enterprises fail to cope with such challenges, middle managers may face reduced budgets and salaries or even unemployment. In this light, studying middle managers’ responses to environmental regulation helps us understand how middle managers cope with the potential threat to their careers.

Limitations and future research
The first limitation of this study is that its cross-sectional design may not have allowed us to confirm causality in our research. Thus, future researchers should use longitudinal or experimental research designs to better understand the causality of the relationships examined in this study. In addition, we failed to collect objective data on environmental regulation. Prior research has demonstrated that perception of the environment influence individual attitudes and behavior; however, we should examine whether we can replicate our results with objective measures of environmental regulation. Finally, as common methods variance may confound our results, future research should collect data from different resources or different time points.

References


Further reading


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The effects of employee stock ownership plans on career development in a new era
Evidence from China’s manufacturing transformation

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Abstract

Purpose – China’s workforce is currently experiencing increased career-related stress. Employee stock ownership plans (ESOPs) may be used to help employees overcome these challenges. Little is known about how ESOPs affect employee career development. The purpose of this paper is to investigate the relationship between ESOPs and employee career sustainability and provide guidance for corporate management.

Design/methodology/approach – The authors employed a multiple linear regression model using a sample of 614 companies that implemented ESOPs between July 2014 and September 2017.

Findings – Employees’ career development benefited when ESOP funds originated from employee compensation and self-raised funds, and when the plan’s stock came from a source other than the secondary market. Career development also improved when employees and senior executives held a higher proportion of a firm’s total shares. In addition, the benefits to employee career development were greater in manufacturing enterprises, non-state-owned enterprises, and in Southern China.

Research limitations/implications – This study combined individual and organization research using person–organization fit theory and demonstrated that well-designed ESOPs are beneficial for career stability and sustainability. This work was based on data from Chinese companies; future studies could usefully investigate the effects of ESOPs in other countries and their particular impact in technology-intensive industries.

Practical implications – Decision makers in firms or government can use ESOPs to address employees’ career-related stress and challenges, especially during industry transformation.

Originality/value – The paper fills a gap in ESOPs research by showing the positive effects of ESOPs on career development.

Keywords Manufacturing transformation, ESOPs, Career development, Job satisfaction, Training investment, Career paths

Paper type Research paper

1. Introduction

The importance of human capital in China’s manufacturing transition has received much attention. Since the program of “reform and opening up” began in 1978, the strength of China’s manufacturing sector has steadily grown, turning China into the world’s primary manufacturing country. However, unlike many parts of the world, China’s manufacturing industry retained middle- to low-end manufacturing for many years, and relied on workers with little education who engaged in simple and repetitive tasks, on a huge population scale. Following the 2008 international economic crisis, China’s manufacturing industry has gradually been losing its low-cost competitive advantage as land, labor and other...
production factors have become increasingly expensive, even as the world economy has weakened (Chin et al., 2016). In the face of these dual pressures, bringing about a national manufacturing transition has become an urgent priority. In essence, moving the manufacturing industry up the value chain is a process where, as firms’ human resources accumulate knowledge and information, companies increase their capacity for research and development, improve their design and marketing capabilities, and develop their skills in cooperating and coordinating with external partners (Hao et al., 2016).

Employee stock ownership plans (ESOPs) can be very useful in helping to deal with this difficult time. An important type of stock incentive that affects a wide range of employees, ESOPs first originated in the USA and subsequently emerged elsewhere, for example, in Russia, England, France and Japan (Pierce et al., 1991; Rousseau and Shperling, 2003; Gulen and Ion, 2016; Jens, 2017). ESOPs appeared in China in the early years of the reform and opening up program (Chan and Tan, 2015), alongside the marketization of firms. Initially, ESOPs were the chief means by which joint-stock companies were formed, but remained relatively unchanged until recently. On 20 June 2014, the China Securities Regulatory Commission published a document entitled “Guidance on the Launching of Pilot Employee Stock Ownership Plans for Listed Companies” (hereafter referred to as “ESOP Guidance”), which explicitly encouraged listed companies to implement pilot ESOPs, a move that officially opened the door to a new stage of ESOP implementation within China’s “New Era” and began a phase of standardized development of ESOPs throughout the country.

The question remains, however, as to whether ESOPs can help manufacturing workers achieve a sustainable career. Although there is a general consensus in the affirmative (Judge, 1994; Deng et al., 2011), researchers have typically treated ESOPs as a black box (Ahrens et al., 2018), whereas in reality ESOPs are composed of many different, and even conflicting, dimensions. Therefore, further investigation is required as to whether the different compositional dimensions of ESOPs are in fact aligned with employee career development.

Individual career development results from a combination of personal effort and organizational support (Weng and Mcelroy, 2010; Eesley and Wang, 2017). ESOPs help production workers achieve career success, such as increased salary and job satisfaction and better training, while simultaneously reorganizing working relationships with their employer (Akkermans and Tim, 2017; Jawahar et al., 2012). Regrettably, however, previous research on career development has overwhelmingly focused either on an individual perspective or on the organizational level (Krishnan and Maheshwari, 2011). The literature lacks analyses conducted using a combination of both organizational and individual perspectives, and has thus far been unable to ascertain the key organizational-level factors that affect career development for individual employees. There is a need, therefore, for an in-depth investigation into questions of employee career development that merges both individual and organizational elements.

This study served primarily to research the effects of ESOPs on employee career development during China’s manufacturing transition. To this end, an in-depth investigation into the effects of various compositional dimensions of ESOPs on employee career development was conducted, and analyses were performed to explore the effect of different industries, business ownership structures and geographical location on employee career development, to help formulate a more holistic understanding of the relationship between ESOPs and employee career development.

2. Literature review and hypothesis formulation
2.1 General theory on ESOPs and employee career development
Past research into employee career development has primarily operated from one of two perspectives: researchers either investigated career planning, decision making, and
consultation from an individual point of view, or they studied questions of career management and development from an organizational perspective (Weng and Mcelroy, 2010; Eesley and Wang, 2017). Although both perspectives concern questions related to career development, previous research has very rarely merged the two approaches. Early scholars of career development research described this phenomenon as an “odd disconnect” (Cable and Judge, 1997). Researchers studying individual career development seldom seriously consider the influence of organizational characteristics on individual careers, while scholars interested in organizational career development rarely focus on well-studied questions within individual career development, and scarcely pay any attention to questions regarding the compatibility between individuals and their environments (Verquer et al., 2003; Krishnan and Maheshwari, 2011; Chin et al., 2018).

This phenomenon springs from the differences in research perspectives and objectives of the two types of research. Organizational career management operates from an organizational perspective and is based in the culture or ideas of an organization and its organizational strategy, with the aim of developing the organization as a whole. Individual career management, on the other hand, operates from the perspective of individual employees and is based in individual values or ideas; an individual’s career development is the objective. As Table I demonstrates, except for the fact that the object being managed is the employee’s career in both organizational and individual career management, the subjects, objectives and strategies of these perspectives differ.

Since Chatman (1989) first advanced the person–organization fit theory, research into this theory has generally focused on aspects such as the ideas, key elements, structural models and degrees of fit, as well as antecedent and outcome variables and relationships within person–organization fit. Scholars in China and elsewhere have developed an array of positions and opinions, but the field essentially agrees on the concept of person–organization fit itself (Downes et al., 2017). Research has shown that when the organization and the individual collectively manage the employee’s career and bear collective responsibility, the employee’s professional performance benefits (Kristof, 1996). This is a precondition for employees to achieve sustainable career development and professional success within an organization. By its nature, an ESOP is a systemic arrangement that binds together employee and organizational benefits (O’Reilly et al., 1991; Cable and Judge, 1997; Goodman and Svyantek, 1999; Verquer et al., 2003). Scholars essentially agree that ESOPs have an incentivizing effect on employee career development. Burack noted that not only do both the organization and the

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<th>Goal</th>
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<td>Employee's</td>
<td>Organization</td>
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<td>career</td>
<td>development</td>
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Source: The authors
individual have a common responsibility for career management, but also that if both parties join forces in the practice of management decisions, both will benefit. Based in person–organization fit theory, Baruch (2006) constructed a dynamic equilibrium model of person–organization career management that included levels for values, strategies and behaviors. Krishnan and Maheshwari (2011) verified that within the organizational career system – which includes direction provided by the labor market, the direction in which employees develop and the lateral movement of employees – the level of satisfaction in one’s work and organizational commitment are positively correlated with the fit between the person and the organization.

However, ESOPs are in reality a black box. They are composed of several differing, and even conflicting, dimensions. Whether there are differences in how these dimensions affect ESOPs is unknown, and is an aspect that previous research has not considered (Chiu et al., 2005). Furthermore, the existing literature about share incentives and employee career development is often limited to analyses of top management, with very little research on a wider range of rank-and-file employees (Davoine and Ravasi, 2013). Therefore, the field requires further analysis of whether the core ESOP dimensions that affect the direction and path of employee career development are the same for ordinary employees as for senior executives.

2.2 Sources of funding and employee career development

In the relationship between ESOPs and career development, the source of funding certainly plays an important role. According to the ESOP Guidance, the sources of funding for ESOPs can be divided into various channels, including an employee’s legal compensation and other sources of income permitted under legal and administrative regulations. In practice, a firm’s sources of funding during the implementation of ESOPs are manifold, but can generally be categorized as one of the following: funding sourced from employee’s compensation, employee pooled funds, a portion of company profits, or financing from loans, pledges, or guarantees provided by shareholders or actual controllers, among other possible sources. Differing sources of funding create different effects on the incentives and constraints employees face: if an ESOP’s funding comes from employee compensation or employee pooled funds, then participation in the plan implies that those employees approve of the exercise price, and reflects the fact that participating employees have optimistic expectations and endorse the firm’s prospects for development (Core and Guay, 2001). This occurs because if the performance of the firm deteriorates, the employees participating in the ESOP will necessarily bear a certain amount of risk from any fall in stock prices; this risk creates a large incentive for employees to invest in their work (Kim and Ouimet, 2014). If funding for an ESOP is derived from a firm’s net profits after tax, or if shareholders or the actual controller provide funding with withdrawals from pledges, loans or guarantees, then participation in the ESOP does not necessarily illustrate whether employees agree with the exercise price, since participating does not cause them to bear any risk. The reactions of the stock market will therefore have a limited constraining or incentivizing effect on participating employees (Deng et al., 2011). From the theory, then, we can see that funding for an ESOP which originates in employee compensation or from employee pooled funds is more fully able to realize the goal of “binding interests, sharing risks and sharing profits,” characteristics which help to incentivize those participating in an ESOP and increase employee satisfaction. If workers are also investors, a firm will tend to invest more in employee training and help broaden employee career paths and opportunities. Therefore, funding sourced from employees’ own compensation or from employee pooled funds will tend to be more beneficial for employee career development.

Based on the above analysis, we formulated the following hypothesis:

**H1.** ESOPs in which funding is sourced from employee compensation or employee pooled funds will be more beneficial to employee career development.
2.3 Sources of stock and employee career development

The sourcing of stock in an ESOP is the core of the entire plan. As the ESOP Guidance states, an ESOP's shares may be sourced from: buy-backs from listed companies, purchases on the secondary market, subscriptions to non-public shares, voluntary grants from shareholders and other such sources. In practice, the source of stock within an ESOP generally falls into one of three categories: purchases on the secondary markets, subscriptions to non-public shares and voluntary grants from shareholders. According to the ESOP Guidance and an additional document, published in China in 2017 “Rules for the Implementation of Non-Public Shares of Listed Companies,” if the stock for an ESOP is sourced from subscriptions to non-public shares, then employee shares will be locked for a period of 36 months before the employees are permitted to transfer or sell their stock. If the ESOP stock is sourced from the secondary market, then shares will be locked for a period of 12 months before employees may sell or transfer them. It is generally agreed that the longer the lock-up period, the greater the risk an investor faces (Campbell and Wesley, 1993).

Relative to other possible sources of ESOP stock, employees face the highest risk through subscription to non-public shares. From this we can infer that employees who participate in an ESOP via subscription to non-public shares are more satisfied with their company, that they will focus more on the long-term development of their company, that they will strive to improve the company’s performance and that the firm will have greater capacity to invest in the development of its employees’ careers (Hales et al., 2014).

Considering the sourcing of stock from a slightly different perspective, subscriptions to non-public shares can be issued at 90 percent of a firm's benchmark share price. That is to say, non-public shares are typically issued at a slightly lower price than the market price for the firm; subscribing to non-public shares gives employees greater room for growth in the price of their stock. This makes employees more inclined to adopt this purchasing method, and causes them to be more willing to engage in activities that accelerate their own career. Furthermore, stock that is not sourced via purchase on the secondary market can in part come from untaxed gifts from major shareholders. To a certain extent, this can incentivize employees to engage enthusiastically in their work and thus advance their career development (Edmans, 2011). Therefore, we conclude that ESOPs in which stock comes from an issuance of non-public shares will be better for employee career development, which is to say that ESOPs with stock sourced via subscription to non-public shares will have a greater positive impact on employee career development.

On the basis of the above analysis, we formulated the following hypothesis:

H2. ESOPs in which stock is sourced from subscriptions to non-public shares will be more advantageous to employee career development than other sources of stock.

2.4 Proportion of shares allocated to the ESOP and employee career development

The proportion of shares an ESOP can take relative to a firm’s total share capital is actually rather limited. Regarding individual employee holdings and total employee holdings in an ESOP, the ESOP Guidance stipulates that “for a listed company, the total accumulated quantity of valid shares held in an ESOP must not exceed 10 percent of the total share capital of the company; the total accumulated quantity of shares corresponding to share equity obtained by any individual employee must not exceed 1 percent of the total share capital of the company.” A comparison of the market performance of 13 listed companies where the proportion of shares held by employees exceeded 10 percent found that their market performance was 62–75 percent superior to that of their peers (Wagner and Rosen, 1985). Generally speaking, this new round of ESOPs controls and to a certain extent limits the total amount of shares that can be held, helping prevent the “free-rider problem.” Concomitantly, some past ESOPs exhibited a tendency toward a sort of egalitarianism.
Regulating the quantity of shares, individuals can hold allows the proportion of shares within an ESOP to tend toward management and technical personnel while also ensuring to the greatest extent possible that the system is fair – a much more reasonable arrangement. The proportion of total shares held by employees participating in an ESOP also affects the company. The higher the proportion of total shares held by employees, the clearer it is that they, as insiders, have a positive outlook on the company’s future, that they will make greater efforts to increase the company’s market value, and that the company will further endeavor to invest in their career development. A higher share value also increases the income employees receive, augmenting employee satisfaction. Furthermore, an ESOP refashions employee identity from mere supplier of labor into a proprietor of the company, opening a path for employees to gradually participate at the decision-making level: such employees can influence career development paths, employee-training investment and other company-level decisions, as well as the quality of decisions made (Jones and Kato, 1995). As the proportion of shares held by participating employees increases, they have greater license to influence company decision making (FitzRoy and Kraft, 1987). Therefore, we have reason to believe that the greater the proportion of shares held by employees, the better their career development prospects.

On the basis of the above analysis, we formulated the following hypothesis:

\[ H3. \] The higher the proportion of shares allocated to the ESOP, the greater the benefit for employee career development.

### 2.5 Proportion of shares held by senior executives and employee career development

Top-level management, middle management and ordinary employees can all participate in ESOPs. Because the way in which employees with different positions and functions affect a company’s performance varies, their influence on employee career development should, in theory, also differ. Generally speaking, managers are able to influence the future direction and development of a company, and can have a significant impact on a firm’s decision making. Ordinary employees, on the other hand, have a comparatively smaller effect on a firm’s decision making. These differences have given rise to three general perspectives: first, ordinary employees holding shares at a large scale may generate free-riding problems, hurting company performance and decreasing employee satisfaction (Kim and Ouimet, 2014). Second, management-level employees are more than four-times more likely to participate in ESOP schemes compared with rank-and-file employees (Welz and Fernández-Macías, 2008). This occurs because senior executives with a large proportion of shares are able to reduce agency costs, and they attach greater importance to issues related to long-term development, such as employee training. Third, managerial-level employees have clearer informational advantages compared with regular employees. A survey found that, starting in the 1980s, more middle managers and key technical personnel began to hold shares in ESOPs, a basic characteristic that conveyed positive signals to encourage investment in the company, while also opening up career development paths for employees (Brandes et al., 2003).

Senior executives generally enjoy clear informational advantages, and their influence on company decision making in areas such as employee training and career advancement is far greater than that of ordinary employees. Furthermore, their foundation of background knowledge and education tends to be more solid, typically giving them a more open perspective on development and growth. This allows them to place greater emphasis on matters relating to long-term growth, such as investment in education and training. Therefore, the higher the proportion of ESOP shares held by top-level management, the better it should be for employee career development.

Based on the above analysis, we formulated the following hypothesis:

\[ H4. \] The greater the proportion of ESOP shares held by senior executives, the better it is for employee career development.
3. Research design

3.1 Sample selection and data sources

The sample for this study comprised companies participating in ESOP schemes on the Shanghai Stock Exchange Main Board A-shares, as well as those firms participating in ESOP schemes with A-shares on the Main Board, the Small and Medium Enterprise Board and the Growth Enterprises Market Board of the Shenzhen Stock Exchange, from July 1, 2014 to September 30, 2017.

This study compiled a total of 770 initial announcements of ESOPs. In order to ensure the accuracy and reliability of these data, we performed the following screening procedures. First, listed firms with special treatment, special treatment with withdrawal risk and particular transfer were removed from the sample. Second, firms that announced they would be implementing ESOPs shortly after being listed on the market were removed from the sample, to avoid a window of observation that was too short. Third, firms that halted trading activities for an extended period of time due to events such as a major reorganization of assets or issuance of non-public shares were removed from the sample. Fourth, throughout the entire window of our analysis, many listed companies issued several rounds of ESOP shares. Our analysis adopted a ground rule of preserving only the first instance of announcing the issuance of stock for an ESOP within the time frame of our study. Elimination of these superfluous events resulted in a sample of 614 events and guaranteed a clean estimation window. The final effective sample consisted of 614 firms, comprising 35, 271, 150 and 158 firms from 2014, 2015, 2016 and 2017, respectively. This study winsorized all data at the 1 and 99 percent levels, to smooth the data and eliminate extreme outliers.

ESOP data used in this study came primarily from the financial database, Wind. To supplement our analysis, we also monitored the website www.cninfo.com.cn for any ESOP announcements made by listed firms. Data on employee career development were manually collected from corporate social responsibility reports, annual financial reports and official websites of listed companies. Other data on accounting performance were obtained from the China Stock Market & Accounting Research database. To prevent errors caused by human treatment of the data, the investigators verified the process by performing the entire data treatment process twice.

3.2 Definition of variables

3.2.1 Explained variables. Career development can be defined as the modes of occupational experience spanning a person’s entire life (Greenhaus et al., 2008; Arthur et al., 1989). The present study required the measurement of two different dimensions of employee career development, i.e., individual- and organizational-level dimensions. For individual-level employee career development, we took employee satisfaction as our measure. To evaluate organizational-level career development, we used investment in employee training and organizational emphasis on career development paths as our measure.

Job satisfaction. A common approach to measuring job satisfaction involves holistically inspecting employee occupational satisfaction using data from a firm’s in-house surveys – the data used in the present study come from employee satisfaction data provided by companies.

Training investment. In our study, references to “training” refer to on-the-job training (Berker and Gerhart, 1996). Leading organizations tend to invest more in human resources practices, in order to advance company development. Employees also benefit from these practices, one positive effect of this type of investment being to increase employee career opportunities.

Career paths. Employee career paths are typically investigated as dummy variables. Although this simplifies the research process, it causes the loss of a large number of degrees
of freedom, and can lead to problems of multicollinearity (Weng and McElroy, 2012). Therefore, this study used content analysis to measure the development of employee career paths. We used the number of Chinese characters relating to employee career development in firms’ annual financial reports and corporate social responsibility reports to measure this variable. In particular, “career development,” “career path,” “sustainable career,” “career management,” “career growth,” “career stage” and “career success” were used as keywords for the content search.

3.2.2 Explanatory variables. Funding source (funding): the primary sources of funding for ESOPs include the following: employee compensation and employee pooled funds; funds extracted from a firm’s net profits after tax; and stockholders or actual controllers providing financing from pledges, guarantees or loans. For the purposes of this study, we defined the funding source as “one” if the funding originated from employee compensation or employee pooled funds, and any other source of funding as “zero.”

Stock source (stock): the source of stock within an ESOP can be divided into purchases on the secondary market, subscriptions to non-public shares and voluntary grants from shareholders. This study defined the variable stock as “one” if the ESOP shares were not sourced from the secondary market (i.e. if they were sourced from shareholder grants, buybacks from public companies, or private placement), and as “zero” if the shares were purchased on the secondary market.

Employee shares (employee): employee shares were defined as the number of shares allocated to an ESOP/the total share capital at the previous year’s end.

Executive shares (executive): executive shares were defined as the proportion of ESOP shares held by management-level executives over the total share capital.

3.2.3 Controlled variables. Firm size (size): the size of a company affects the shares held by employees: large companies are less capable of observing the level of effort employees make, making free-rider problems more likely within larger companies (Kandel and Lazear, 1992). This study used the natural logarithm of the total assets of a company taken from its consolidated end-of-year financial statements to measure the size of the company.

Firm solvency: this study used both short- and long-term measures for firm solvency. First, short-term solvency (lev1) was calculated as the annual or bi-annual current ratio of the year in which an event occurred, where the current ratio = (current assets/current liabilities) × 100 percent. Second, long-term solvency (lev2) was calculated as the annual debt-to-asset ratio of the year in which an event occurred, where the debt-to-asset ratio = (total liabilities/total assets) × 100 percent.

Operational capacity: this study included two measures of operational capacity. First, the operational capacity of human resources (rtr1) in this study was calculated as labor productivity of the year in which an event occurred, where labor productivity = (net revenue of primary operations/number of employees) × 100 percent. Second, the operational capacity of capital goods (rtr2) was calculated as the annual accounts receivable turnover ratio of the year in which an event occurred, where the annual accounts receivable turnover ratio = (net credit sales/average accounts receivable) × 100 percent.

Corporation profitability (roe): this study followed the method of Aggarwal and Samwick, using the return on equity (ROE) of the year in which an event occurred to measure the profitability of the corporation, as the ROE reflects the rate of return on investment for all of a firm’s interests, defined as the return on equity = (net income/stockholders’ equity) × 100 percent.

Growth capacity (grow): this study used the year-on-year net income growth of the year in which an event occurred to measure a firm’s capacity for growth, where net income growth (year-on-year) = [(net profit of current period – net profit of previous period)/net profit of previous period] × 100 percent.
Ownership concentration (cr10): this study followed the methods of Porta et al. (1999), and used the total proportion of shares held by the ten largest shareholders of the year in which an event occurred as a proxy for ownership concentration.

3.3 Construction of the model
We included employee satisfaction, investment in employee training and a firm’s engagement in developing employee career paths as outcome variables. The explanatory variables of this study included an ESOP’s sources of funding, sources of shares, proportion of shares allocated to an ESOP and proportion of shares held by senior executives. Controlling other variables to the greatest extent possible, we constructed a multiple linear regression model, as presented below:

$$\text{career}_i = \beta_{i0} + \beta_{i1} \times \text{funding} + \beta_{i2} \times \text{stock} + \beta_{i3} \times \text{employee} + \beta_{i4} \times \text{executive}$$

$$+ \beta_{i5} \times \text{size} + \beta_{i6} \times \text{lev1} + \beta_{i7} \times \text{lev2} + \beta_{i8} \times \text{rtr1} + \beta_{i9} \times \text{rtr2} + \beta_{i10} \times \text{roe}$$

$$+ \beta_{i11} \times \text{grow} + \beta_{i12} \times \text{cr10} + e_i.$$ 

In the above model, $i \in [0, 2] \in [0, 2]$. When $i = 0$, career$_0$ takes on the values of job satisfaction. $\beta_{0k}(k \in [0, 12])$ gives the respective coefficients for the explanatory variables. When $i = 1$, career$_1$ takes the values of training investment, i.e., the investment in employee training per person, and $\beta_{1k}(k \in [0, 12])$ gives the respective coefficients for the explanatory variables. When $i = 2$, career$_2$ takes on the values of the variable career paths, i.e., a firm’s emphasis on employee career development paths, and $\beta_{2k}(k \in [0, 12])$ gives the respective coefficients for the explanatory variables.

4. Results
4.1 Descriptive statistics
From the summary statistics of the continuous variables in Panel A of Table II, we can see that employee satisfaction gives an average value of 60.01, indicating that employees in a company that implements an ESOP are overall rather satisfied with their occupation. On the other hand, the average value of the variable training is 31.70, indicating that employees are moderately trained. The average value of the variable paths is 30.05, indicating that the firm has a strong emphasis on employee career development paths. The average value of the variable executive is 0.20, indicating that a small proportion of shares are held by senior executives. The average value of the variable size is 22.14, indicating that the firm has a moderate size. The average value of the variable lev1 is 2.38, indicating that the firm has a low level of leverage. The average value of the variable lev2 is 41.33, indicating that the firm has a high level of leverage. The average value of the variable rtr1 is 13.32, indicating that the firm has a moderate level of receivables turnover. The average value of the variable rtr2 is 25.14, indicating that the firm has a high level of receivables turnover. The average value of the variable roe is 7.05, indicating that the firm has a low level of return on equity. The average value of the variable cr10 is 58.71, indicating that the firm has a high level of concentration.

Panel A: continuous variables
<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>Max.</th>
<th>75%</th>
<th>Median</th>
<th>25%</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>satisfaction</td>
<td>614</td>
<td>60.01</td>
<td>7.21</td>
<td>75.00</td>
<td>65.00</td>
<td>60.00</td>
<td>55.00</td>
<td>40.00</td>
</tr>
<tr>
<td>training</td>
<td>614</td>
<td>31.70</td>
<td>4.56</td>
<td>40.00</td>
<td>35.00</td>
<td>30.00</td>
<td>30.00</td>
<td>20.00</td>
</tr>
<tr>
<td>paths</td>
<td>614</td>
<td>30.05</td>
<td>5.85</td>
<td>45.00</td>
<td>35.00</td>
<td>30.00</td>
<td>25.00</td>
<td>15.00</td>
</tr>
<tr>
<td>employee</td>
<td>614</td>
<td>0.20</td>
<td>0.22</td>
<td>1.04</td>
<td>0.26</td>
<td>0.14</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>executive</td>
<td>614</td>
<td>26.79</td>
<td>23.42</td>
<td>97.48</td>
<td>40.80</td>
<td>21.04</td>
<td>7.47</td>
<td>0.00</td>
</tr>
<tr>
<td>size</td>
<td>614</td>
<td>22.14</td>
<td>1.15</td>
<td>25.93</td>
<td>22.69</td>
<td>21.98</td>
<td>21.35</td>
<td>19.97</td>
</tr>
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<td>lev1</td>
<td>614</td>
<td>2.38</td>
<td>1.99</td>
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<td>6.29</td>
<td>1.76</td>
<td>1.25</td>
<td>0.32</td>
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<td>lev2</td>
<td>614</td>
<td>41.33</td>
<td>20.25</td>
<td>90.51</td>
<td>55.64</td>
<td>39.88</td>
<td>25.18</td>
<td>6.87</td>
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<td>rtr1</td>
<td>614</td>
<td>13.32</td>
<td>0.92</td>
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<td>13.43</td>
<td>12.87</td>
<td>11.62</td>
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<td>95.20</td>
<td>721.10</td>
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<td>0.00</td>
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<tr>
<td>roe</td>
<td>614</td>
<td>7.05</td>
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<td>6.75</td>
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<tr>
<td>grow</td>
<td>614</td>
<td>2.43</td>
<td>312.24</td>
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<td>57.12</td>
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<td>-1,746.03</td>
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<td>cr10</td>
<td>614</td>
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<td>13.35</td>
<td>88.75</td>
<td>68.18</td>
<td>60.02</td>
<td>49.69</td>
<td>25.94</td>
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</table>

Panel B: dummy variables
<table>
<thead>
<tr>
<th>Variable</th>
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<th>X = 0</th>
<th>X = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>funding</td>
<td>614 (100%)</td>
<td>209 (34.04%)</td>
<td>405 (65.96%)</td>
</tr>
<tr>
<td>stock</td>
<td>614 (100%)</td>
<td>357 (58.14%)</td>
<td>257 (41.86%)</td>
</tr>
</tbody>
</table>

Table II. Summary statistics
Source: The authors’ calculations performed using Stata 14.0
other hand, average per-employee investment in employee training is 31.70, and the average value for career path is 30.05, indicating that investment in employee training in the sampled firms that implemented ESOPs is relatively low, and that employee career paths are not sufficiently diverse.

From the summary statistics of dummy variables in Panel B of Table II, we can see that in our sample of 614 firms, funding for ESOPs is sourced from employee compensation or employee pooled funds in 405 firms (65.96 percent), while the ESOP shares originate from other sources in 209 firms (34.04 percent), making the incidence of funding from employee compensation or employee pooled funds approximately twice that of funding from other sources. Furthermore, of the 614 firms, shares for ESOPs were purchased from a source besides the secondary market, such as shareholder grants, share buy-backs from the company, or private placement in 257 firms (41.86 percent), while shares were purchased from the secondary market in 357 firms (58.14 percent).

4.2 Correlational analysis
In the first step of the analysis, we ran tests to obtain Spearman correlation coefficients and Pearson correlation coefficients of the primary variables, the results of which can be seen in Table III. Table III shows that there could be a correlational relationship between the explained variables and a subset of the explanatory variables, which requires further empirical analysis. Additionally, the correlation coefficients between the explanatory variables and control variables were all clearly less than 0.5, which shows that the correlation between the explanatory variables and control variables is relatively weak. These tests of correlation coefficients indicate that there are no serious issues of multicollinearity between the variables under examination.

4.3 Hypothesis testing
Combining the multiple regression models constructed in this study with the estimates of coefficients given in Table IV, we can arrive at the following results.

First, sources of funding: the coefficients of the explanatory variables sources of funding on employee satisfaction, investment in employee training and employee career paths are all significantly positive at the level \( p = 1 \) percent, with coefficients of 1.7307, 1.5100 and 1.9276. This suggests that \( H1 \) essentially holds, and that using employee compensation or employee pooled funds as the source of funding for an ESOP is most beneficial to employee career development.

Second, source of stock: the coefficients of the variable source of ESOP stock are significantly positive at the \( p = 1 \) percent level for the outcome variables of employee satisfaction and investment in employee training, with coefficients of 1.7863 and 1.0340, respectively; the effect of the source of ESOP stock on employee career paths is significant at the \( p = 5 \) percent significance level, with a coefficient of 1.0644. Taken together, these results attest to the validity of \( H2 \) suggesting that employee career development benefits from the shares in an ESOP being sourced from subscriptions to private placements.

Third, the proportion of shares allocated to an ESOP: the proportion of shares held by employees in an ESOP is significantly positive for the outcome variable investment in employee training at the level of \( p = 1 \) percent, with a coefficient of 2.1406; the coefficient is significantly positive at the 5 percent level for the outcome variable employee satisfaction, with a coefficient of 2.6725; and significantly positive at the 10 percent level for the outcome variable employee career paths, with a coefficient of 1.9896, providing support for \( H3 \). This shows that the higher the proportion of shares allocated to an ESOP, the more employee career development benefits.

Fourth, the proportion of ESOP shares held by senior executives: the coefficient is significantly positive at the \( p = 1 \) percent level for the outcome variables of employee
### Table III. Correlation coefficients

<table>
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<th></th>
<th>satisfaction</th>
<th>input</th>
<th>path</th>
<th>fund</th>
<th>stock</th>
<th>inside</th>
<th>mana</th>
<th>size</th>
<th>lev1</th>
<th>lev2</th>
<th>rtr1</th>
<th>rtr2</th>
<th>me</th>
<th>grow</th>
<th>cr10</th>
</tr>
</thead>
<tbody>
<tr>
<td>satisfaction</td>
<td>1.000</td>
<td>0.184***</td>
<td>0.123***</td>
<td>0.103***</td>
<td>0.111***</td>
<td>0.091**</td>
<td>0.094**</td>
<td>-0.012</td>
<td>-0.044</td>
<td>0.031</td>
<td>-0.025</td>
<td>0.028</td>
<td>-0.049</td>
<td>0.014</td>
<td>-0.007</td>
</tr>
<tr>
<td>training</td>
<td>0.153***</td>
<td>1.000</td>
<td>0.137***</td>
<td>0.159***</td>
<td>0.088**</td>
<td>0.109***</td>
<td>0.079*</td>
<td>0.073*</td>
<td>-0.059</td>
<td>0.107***</td>
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<td>0.018</td>
<td>0.050</td>
<td>0.008</td>
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<tr>
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<td>0.115***</td>
<td>1.000</td>
<td>0.159***</td>
<td>0.066</td>
<td>0.081**</td>
<td>0.098**</td>
<td>0.076*</td>
<td>-0.029</td>
<td>0.047</td>
<td>-0.014</td>
<td>0.039</td>
<td>-0.009</td>
<td>0.073*</td>
<td>-0.049</td>
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<td>funding</td>
<td>0.116***</td>
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<td>0.157***</td>
<td>1.000</td>
<td>-0.122***</td>
<td>0.042</td>
<td>-0.015</td>
<td>0.137***</td>
<td>-0.140***</td>
<td>0.179***</td>
<td>0.097**</td>
<td>0.027</td>
<td>0.010</td>
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<td>-0.052</td>
</tr>
<tr>
<td>stock</td>
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<td>0.098**</td>
<td>0.056</td>
<td>-0.122***</td>
<td>1.000</td>
<td>0.003</td>
<td>0.000</td>
<td>-0.066</td>
<td>0.109***</td>
<td>-0.120***</td>
<td>-0.095**</td>
<td>-0.040</td>
<td>-0.005</td>
<td>0.001</td>
<td>0.114***</td>
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<td>0.070*</td>
<td>0.059</td>
<td>0.048</td>
<td>0.056</td>
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<td>1.000</td>
<td>-0.033</td>
<td>-0.031</td>
<td>-0.048</td>
<td>0.082**</td>
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<td>0.018</td>
<td>-0.041</td>
<td>0.011</td>
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<tr>
<td>executive</td>
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<td>0.072*</td>
<td>0.073*</td>
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<td>-0.015</td>
<td>0.046</td>
<td>1.000</td>
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<td>0.036</td>
<td>-0.052</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.087**</td>
<td>0.019</td>
<td>-0.073*</td>
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<tr>
<td>size</td>
<td>-0.009</td>
<td>0.059</td>
<td>0.078*</td>
<td>0.133***</td>
<td>-0.045</td>
<td>-0.091**</td>
<td>-0.140***</td>
<td>1.000</td>
<td>-0.347***</td>
<td>0.592***</td>
<td>0.468***</td>
<td>0.196***</td>
<td>0.129***</td>
<td>0.049</td>
<td>0.004</td>
</tr>
<tr>
<td>lev1</td>
<td>-0.071*</td>
<td>-0.026</td>
<td>-0.083**</td>
<td>-0.159***</td>
<td>0.101**</td>
<td>-0.050</td>
<td>0.006</td>
<td>-0.410***</td>
<td>1.000</td>
<td>-0.660***</td>
<td>-0.179***</td>
<td>-0.106***</td>
<td>-0.003</td>
<td>0.003</td>
<td>0.095**</td>
</tr>
<tr>
<td>lev2</td>
<td>0.023</td>
<td>0.088**</td>
<td>0.040</td>
<td>0.175***</td>
<td>-0.121***</td>
<td>0.044</td>
<td>-0.043</td>
<td>0.555***</td>
<td>-0.295***</td>
<td>1.000</td>
<td>0.385***</td>
<td>0.180***</td>
<td>-0.054</td>
<td>-0.111***</td>
<td>-0.091***</td>
</tr>
<tr>
<td>rtr1</td>
<td>-0.045</td>
<td>0.012</td>
<td>0.002</td>
<td>0.111***</td>
<td>-0.102***</td>
<td>-0.095**</td>
<td>-0.012</td>
<td>0.434***</td>
<td>-0.225***</td>
<td>0.367***</td>
<td>1.000</td>
<td>0.207***</td>
<td>0.112***</td>
<td>0.023</td>
<td>0.038</td>
</tr>
<tr>
<td>rtr2</td>
<td>0.007</td>
<td>0.021</td>
<td>0.000</td>
<td>0.039</td>
<td>-0.101***</td>
<td>0.020</td>
<td>-0.020</td>
<td>0.219***</td>
<td>-0.204***</td>
<td>0.127***</td>
<td>0.284***</td>
<td>1.000</td>
<td>-0.016</td>
<td>-0.003</td>
<td>0.052</td>
</tr>
<tr>
<td>roe</td>
<td>-0.063</td>
<td>0.058</td>
<td>-0.039</td>
<td>0.015</td>
<td>-0.018</td>
<td>-0.061</td>
<td>-0.161***</td>
<td>0.138***</td>
<td>0.022</td>
<td>0.025</td>
<td>0.157***</td>
<td>0.182***</td>
<td>1.000</td>
<td>0.600***</td>
<td>0.116***</td>
</tr>
<tr>
<td>grow</td>
<td>0.036</td>
<td>0.034</td>
<td>0.053</td>
<td>0.075*</td>
<td>0.031</td>
<td>0.032</td>
<td>0.002</td>
<td>0.066</td>
<td>0.042</td>
<td>0.055</td>
<td>-0.031</td>
<td>0.368***</td>
<td>1.000</td>
<td>0.074*</td>
<td></td>
</tr>
<tr>
<td>cr10</td>
<td>-0.010</td>
<td>-0.019</td>
<td>-0.053</td>
<td>-0.053</td>
<td>0.108***</td>
<td>-0.044</td>
<td>-0.065</td>
<td>-0.032</td>
<td>0.058</td>
<td>-0.091***</td>
<td>0.002</td>
<td>0.054</td>
<td>0.161***</td>
<td>0.044</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Notes:** The upper triangle provides results for the test of Spearman's correlation coefficients, and the lower triangle for the test of Pearson's correlation coefficients. *,**,***Significant at the 10, 5 and 1 percent levels, respectively.

**Source:** The authors' calculations were performed using Stata 14.0.
satisfaction, investment in employee training and employee career development paths, with coefficients of 0.0377, 0.0257 and 0.0297, respectively. These findings corroborate $H4$, implying that a higher proportion of ESOP shares held by top management is more advantageous to employee career development.

4.4 Additional analyses

4.4.1 Results with subsamples divided by industry. This study followed the categorization in the “Guide to the Industrial Categorization of Listed Companies (2012 Revision)” from the China Securities Regulatory Commission to separate the firms in the sample into two groups, i.e., manufacturing and non-manufacturing firms. This division yielded 394 manufacturing firms and 220 non-manufacturing firms.

We investigated the differences in the effects of ESOPs on employee career development between the two industrial groupings (Table V). The results showed that when the source of funding is employee compensation or employee pooled funds, investment in employee training and career development paths for manufacturing firms is significantly positive ($p = 1$ percent); for non-manufacturing firms, employee satisfaction and investment in employee training is significantly positive at the $p = 1$ percent level, and career development paths are significantly positive at the 10 percent level.

When the source of shares originated from subscription to private placements, employee satisfaction and investment in employee training in manufacturing firms is significantly positive at the $p = 1$ percent level, and career development significantly positive at the $p = 5$ percent level; within non-manufacturing firms, neither employee satisfaction, investment in employee training, nor career development paths were significant.

For manufacturing firms, the proportion of shares allocated to an ESOP was significantly positive at the 5 percent level for career development paths, and significantly positive at the 10 percent level for employee satisfaction, the proportion of shares allocated to an ESOP was significantly positive at the 1 percent level for investment in training.

The proportion of shares held by senior executives in manufacturing firms was significantly positive at the $p = 1$ percent level for employee satisfaction and investment in training, and significantly positive at the $p = 5$ percent level for career development paths.

<table>
<thead>
<tr>
<th>Funding</th>
<th>Satisfaction</th>
<th>Input</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee</td>
<td>1.7307***</td>
<td>1.5100***</td>
<td>1.9276***</td>
</tr>
<tr>
<td>Executive</td>
<td>0.0377***</td>
<td>0.0257***</td>
<td>0.0297***</td>
</tr>
<tr>
<td>Size</td>
<td>-0.18422</td>
<td>0.17698***</td>
<td>0.0297***</td>
</tr>
<tr>
<td>Lev1</td>
<td>-0.0536</td>
<td>0.1122**</td>
<td>0.1184***</td>
</tr>
<tr>
<td>Lev2</td>
<td>0.0050</td>
<td>0.0217***</td>
<td>0.0004***</td>
</tr>
<tr>
<td>Rtr1</td>
<td>-0.2153</td>
<td>-0.3620***</td>
<td>-0.4159***</td>
</tr>
<tr>
<td>Rtr2</td>
<td>0.0012</td>
<td>-0.0003**</td>
<td>0.0020***</td>
</tr>
<tr>
<td>Roe</td>
<td>-0.0423</td>
<td>0.0560***</td>
<td>-0.0348***</td>
</tr>
<tr>
<td>Grow</td>
<td>0.0011</td>
<td>-0.0011**</td>
<td>0.0018***</td>
</tr>
<tr>
<td>Crt10</td>
<td>-0.0031</td>
<td>-0.0046***</td>
<td>-0.0198***</td>
</tr>
<tr>
<td>Constant</td>
<td>61.6929***</td>
<td>27.7522***</td>
<td>20.9482***</td>
</tr>
<tr>
<td>Observations</td>
<td>614</td>
<td>614</td>
<td>614</td>
</tr>
<tr>
<td>F</td>
<td>3.24</td>
<td>4.37</td>
<td>3.44</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.457</td>
<td>0.672</td>
<td>0.495</td>
</tr>
</tbody>
</table>

Table IV. The effect of ESOPs on career development

Notes: $t$-values are indicated in parentheses. ***,***Significant at the 10, 5 and 1 percent levels, respectively

Source: The authors’ calculations were performed using Stata 14.0
## Table V.

Effects of ESOPs

<table>
<thead>
<tr>
<th>Industry</th>
<th>Manufacturing</th>
<th>Non-manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>satisfaction</td>
<td>input path</td>
</tr>
<tr>
<td>funding</td>
<td>1.0889 (1.41)</td>
<td>1.5358*** (3.14)</td>
</tr>
<tr>
<td></td>
<td>1.7862*** (2.84)</td>
<td>1.6777* (1.93)</td>
</tr>
<tr>
<td>stock</td>
<td>2.4080*** (3.25)</td>
<td>1.3684*** (2.93)</td>
</tr>
<tr>
<td></td>
<td>0.8603 (1.02)</td>
<td></td>
</tr>
<tr>
<td>employee</td>
<td>3.1726* (1.91)</td>
<td>2.4080 (1.33)</td>
</tr>
<tr>
<td></td>
<td>3.8377*** (2.82)</td>
<td>1.1133 (0.39)</td>
</tr>
<tr>
<td>executive</td>
<td>0.0465*** (2.75)</td>
<td>0.0365*** (3.42)</td>
</tr>
<tr>
<td></td>
<td>0.0149 (1.22)</td>
<td>0.0229* (1.94)</td>
</tr>
<tr>
<td>size</td>
<td>0.1961 (0.47)</td>
<td>0.4474*** (1.71)</td>
</tr>
<tr>
<td></td>
<td>-0.3177 (0.83)</td>
<td>-0.2457 (0.47)</td>
</tr>
<tr>
<td>lev1</td>
<td>-0.5466 (1.64)</td>
<td>0.0508 (0.24)</td>
</tr>
<tr>
<td></td>
<td>0.1491 (0.94)</td>
<td>0.1769 (0.81)</td>
</tr>
<tr>
<td>lev2</td>
<td>-0.017 (0.55)</td>
<td>0.0181 (0.93)</td>
</tr>
<tr>
<td></td>
<td>0.0062 (0.26)</td>
<td>0.0150 (0.46)</td>
</tr>
<tr>
<td>rtr1</td>
<td>-0.2136 (0.47)</td>
<td>-0.5186** (1.82)</td>
</tr>
<tr>
<td></td>
<td>0.1300 (0.41)</td>
<td>0.2274 (0.42)</td>
</tr>
<tr>
<td>rtr2</td>
<td>0.0006 (0.18)</td>
<td>-0.0012 (0.61)</td>
</tr>
<tr>
<td></td>
<td>0.0033 (0.19)</td>
<td>0.0018 (0.19)</td>
</tr>
<tr>
<td>roe</td>
<td>-0.0513 (1.16)</td>
<td>0.0363 (1.30)</td>
</tr>
<tr>
<td></td>
<td>0.1045*** (2.66)</td>
<td>-0.0305 (0.56)</td>
</tr>
<tr>
<td>grow</td>
<td>0.0006 (0.64)</td>
<td>-0.0009 (0.10)</td>
</tr>
<tr>
<td></td>
<td>-0.0020 (1.27)</td>
<td>0.0006 (0.28)</td>
</tr>
<tr>
<td>cr10</td>
<td>0.0113 (0.43)</td>
<td>0.0009 (0.75)</td>
</tr>
<tr>
<td></td>
<td>0.0131 (0.12)</td>
<td>0.0073*** (-2.05)</td>
</tr>
<tr>
<td>Constant</td>
<td>54.1042*** (5.99)</td>
<td>24.3216*** (4.26)</td>
</tr>
<tr>
<td></td>
<td>30.2764*** (3.75)</td>
<td>32.6377*** (2.93)</td>
</tr>
<tr>
<td>Observations</td>
<td>394</td>
<td>394</td>
</tr>
<tr>
<td>F</td>
<td>2.96</td>
<td>3.48</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.0612</td>
<td>0.0761</td>
</tr>
<tr>
<td>Notes:</td>
<td>$t$-values are indicated in parentheses. *, **, *** Significant at the 10, 5 and 1 percent levels, respectively.</td>
<td></td>
</tr>
<tr>
<td>Source:</td>
<td>The authors' calculations were performed using Stata 14.0</td>
<td></td>
</tr>
</tbody>
</table>

**Effects of ESOPs on employee career development by industry**
while for non-manufacturing firms the proportion of shares held by senior executives was significantly positive at the 10 percent level for career development paths.

Overall, our results indicate that the benefits attained for employee career development via the implementation of ESOPs are greater within the manufacturing industry compared with the non-manufacturing industry. Furthermore, the implementation of ESOPs within the manufacturing industry has a slightly higher positive impact on employee satisfaction, investment in employee training and employee career development paths compared with the non-manufacturing industry.

4.4.2 Results with subsamples divided by ownership. State-owned enterprises (SOEs) have rather complex and cumbersome chains of principals and agents, and also lack efficient, evidence-based supervisory mechanisms. It was in this context, to address considerations, such as the adjustment of proprietary structures and expansion of financing channels, that ESOPs in China were adopted and developed. Several studies have shown that the greater the proportion of shares in a firm owned by an SOE, the less well the firm performs overall. After implementing an ESOP, management-level employees, key technical personnel and even ordinary employees are able to dilute the proportion of shares held by SOEs through their own ownership of shares.

Based on the Wind database as of June 30, 2018 we identified 67 SOEs and 547 non-SOEs for use in our analysis. The calculations for the different effects of ESOP implementation and employee career development with the sample split by ownership can be seen in Table VI. The empirical results show that when funding for a plan is sourced from employee compensation or employee pooled funds, employee satisfaction, investment in employee training and career development paths for non-SOEs are significantly positive at the $p = 0.01$ level.

Shares sourced from subscriptions to non-public offerings are significantly positive at the $p = 0.01$ level when the outcome variable is employee satisfaction in non-SOEs, and significantly positive at the $p = 0.05$ level for the outcome variables of investment in employee training and career development paths; in SOEs the coefficient is significantly negative at the 10 percent level for the outcome of employee satisfaction.

The proportion of shares allocated to an ESOP in the regression analysis of SOEs was significantly positive at the $p = 0.01$ level for the outcome of employee satisfaction, significantly positive at the $p = 0.05$ level for the outcome career development paths; for non-SOEs, the proportion of shares was significantly positive at the 5 percent level for investment in employee training.

The proportion of shares held by senior executives in SOEs was significantly positive at the $p = 0.01$ level when regressed based on employee satisfaction; for non-SOEs, the proportion of shares held by senior executives was significantly positive at the $p = 0.01$ level for the outcomes of investment in employee training and career development path, and significantly positive at the 5 percent level for the outcome employee satisfaction.

Overall, the results indicate that the implementation of ESOPs brings somewhat more benefit to employee career development in non-SOEs compared with SOEs. Furthermore, employee satisfaction, investment in employee training and a firm’s engagement in employee career development paths are slightly better in non-SOEs compared with SOEs.

4.4.3 Results with subsamples divided by region. In China, cultural differences among regions have a substantial impact on both individual and organizational behaviors. Broadly speaking, the Yangtze River forms the boundary between northern and southern cultures in China. Northerners are taller and burlier, generally viewed as hardy and spirited, with a prominently cooperative nature, and political awareness. Southerners, on the other hand, tend to be slighter in build and are generally seen as more subtle, tactful, meticulous and careful compared with northerners; their sense of economics and market
<table>
<thead>
<tr>
<th></th>
<th>State-owned enterprises satisfaction</th>
<th>State-owned enterprises path</th>
<th>Non-state-owned enterprises satisfaction</th>
<th>Non-state-owned enterprises path</th>
</tr>
</thead>
<tbody>
<tr>
<td>funding</td>
<td>−6.5103 (−1.59)</td>
<td>−1.2388 (−0.39)</td>
<td>1.9258*** (3.05)</td>
<td>1.5877*** (4.05)</td>
</tr>
<tr>
<td>stock</td>
<td>−4.2517* (−1.78)</td>
<td>−0.2160 (−0.56)</td>
<td>0.0769 (0.32)</td>
<td>0.3460 (1.09)</td>
</tr>
<tr>
<td>employee</td>
<td>7.3351*** (2.99)</td>
<td>−0.2997 (−0.77)</td>
<td>−0.3427 (−1.42)</td>
<td>−0.2770 (−0.86)</td>
</tr>
<tr>
<td>executive</td>
<td>0.2033*** (4.04)</td>
<td>0.0228 (0.93)</td>
<td>0.0240 (1.57)</td>
<td>0.0090 (0.44)</td>
</tr>
<tr>
<td>size</td>
<td>1.4683 (1.58)</td>
<td>0.0013 (−0.54)</td>
<td>0.0007 (0.24)</td>
<td>0.0340 (−1.01)</td>
</tr>
<tr>
<td>lev1</td>
<td>−0.0739 (−0.07)</td>
<td>−0.0646 (−1.59)</td>
<td>0.0501** (1.98)</td>
<td>−0.0340 (−1.01)</td>
</tr>
<tr>
<td>lev2</td>
<td>−0.1115 (−1.49)</td>
<td>−0.0005 (−0.65)</td>
<td>0.0015 (1.44)</td>
<td>−0.0340 (−1.01)</td>
</tr>
<tr>
<td>rtr1</td>
<td>0.2422 (0.25)</td>
<td>−0.0188 (−0.24)</td>
<td>0.0015 (1.44)</td>
<td>−0.0013 (−0.54)</td>
</tr>
<tr>
<td>rtr2</td>
<td>−0.0036 (−0.93)</td>
<td>0.0014 (0.41)</td>
<td>0.0015 (1.44)</td>
<td>0.0007 (0.24)</td>
</tr>
<tr>
<td>roe</td>
<td>−0.0261 (−0.28)</td>
<td>0.0038 (0.38)</td>
<td>−0.0129 (−0.89)</td>
<td>−0.0288 (−1.50)</td>
</tr>
<tr>
<td>grow</td>
<td>−0.0014 (−0.49)</td>
<td>0.0358 (1.56)</td>
<td>−0.0646 (−1.59)</td>
<td>−0.0646 (−1.59)</td>
</tr>
<tr>
<td>cr10</td>
<td>−0.0188 (−0.24)</td>
<td>0.0222 (−1.14)</td>
<td>0.0015 (1.44)</td>
<td>−0.0646 (−1.59)</td>
</tr>
<tr>
<td>Constant</td>
<td>27.8735 (1.41)</td>
<td>6.0734 (0.39)</td>
<td>63.2136*** (7.74)</td>
<td>30.0284*** (5.92)</td>
</tr>
<tr>
<td>Observations</td>
<td>67</td>
<td>67</td>
<td>547</td>
<td>547</td>
</tr>
<tr>
<td>$F$</td>
<td>2.36</td>
<td>1.34</td>
<td>3.27</td>
<td>4.14</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.2108</td>
<td>0.0633</td>
<td>0.0517</td>
<td>0.0701</td>
</tr>
</tbody>
</table>

Notes: $t$-values are indicated in parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively.

Source: The authors’ calculations were performed using Stata 14.0
awareness is relatively more accomplished. The sample used in this study included 197 firms from the north and 417 firms from the south. Table VII shows the results as to whether the relationship between ESOPs and employee career development differ across these two regions.

The empirical results showed that when funding for an ESOP comes from employee compensation or employee pooled funds, in southern regions the coefficient is significantly positive at the $p = 1$ percent level for all three outcome variables of employee satisfaction, investment in employee training and career development paths; in the north, the coefficient is significantly positive at the $p = 10$ percent level for the outcome variable career development paths.

When shares are sourced from subscriptions to private placements, in the south the coefficient is significantly positive at the $p = 1$ percent level for employee satisfaction; in the north, the coefficient is significantly positive at the $p = 1$ percent level for both employee satisfaction and investment in employee training, and significantly positive at the 5 percent level for career development paths.

The proportion of shares allotted to an ESOP in the south is significantly positive at the $p = 1$ percent level for investment in employee training, and significantly positive at the $p = 5$ percent level for career development paths; in the north, the proportion of shares allotted is significantly positive at the $p = 10$ percent level for employee satisfaction, and not significant for either investment in employee training or career development paths.

The proportion of shares held by senior executives in southern firms is significantly positive at the $p = 1$ percent level with employee career development paths as the outcome variable, and significantly positive at the $p = 5$ percent level for employee satisfaction and investment in employee training; for northern firms, the proportion of shares held by senior executives is significantly positive at the $p = 5$ percent level for the outcome employee satisfaction, significantly positive at the $p = 10$ percent level for investment in employee training.

These results show that improvements to employee career development garnered by implementing an ESOP are greater in southern firms compared with northern firms. Furthermore, the implementation of ESOPs in the south brings greater benefits in terms of employee satisfaction, investment in employee training and employee career development paths compared with the north.

5. Discussion

5.1 Theoretical contributions

First, this study has emphasized the positive effects of ESOPs on employee career development. This finding is in accordance with previous research, which has found that providing employees with share-based incentives has beneficial effects on employee career development, and is a discovery that provides empirical support for the implementation of ESOPs during the new era of Chinese manufacturing (Oyer, 2008; Burgess et al., 2009). However, in past studies executive management was the subject of investigation that was selected (Hamori and Kakarika, 2010; Vinkenburg and Weber, 2012; Crossland et al., 2014). This focus on the incentives for senior management and the career development of top executives clearly narrowed the scope of research questions that could be addressed. The current study has investigated the relationship between ESOPs and the career development of a broad range of employees, including both senior executives and ordinary employees, adding a further, much-needed perspective to the field of employee career development.

Second, past research on the relationship between ESOPs and employee career development has often treated ESOPs as a unified whole (Driver, 2010). In reality, ESOPs are a concept with a very diverse set of core possibilities: the dimensions that comprise an ESOP
Table VII. Effects of ESOPs on employee career development by region

<table>
<thead>
<tr>
<th></th>
<th>Northern China</th>
<th>satisfaction</th>
<th>path</th>
<th>Southern China</th>
<th>satisfaction</th>
<th>path</th>
</tr>
</thead>
<tbody>
<tr>
<td>funding</td>
<td>0.3443 (0.36)</td>
<td>1.0262 (1.56)</td>
<td>1.5896* (1.86)</td>
<td>2.4062*** (3.03)</td>
<td>1.7542*** (3.72)</td>
<td>2.0189*** (3.23)</td>
</tr>
<tr>
<td>stock</td>
<td>2.4682*** (2.70)</td>
<td>2.0210*** (3.24)</td>
<td>1.6641** (2.06)</td>
<td>1.5945** (2.09)</td>
<td>0.4838 (1.07)</td>
<td>0.8761 (1.46)</td>
</tr>
<tr>
<td>employee</td>
<td>4.2667* (1.72)</td>
<td>-0.8536 (-0.51)</td>
<td>0.2952 (0.14)</td>
<td>2.3550 (1.48)</td>
<td>3.1699*** (3.37)</td>
<td>2.5707** (2.06)</td>
</tr>
<tr>
<td>executive</td>
<td>0.0476** (2.20)</td>
<td>0.0285* (1.93)</td>
<td>0.0290 (1.52)</td>
<td>0.0336** (2.11)</td>
<td>0.0219** (2.32)</td>
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<td>0.0029 (1.63)</td>
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Notes: $t$-values are indicated in parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively

Source: The authors' calculations were performed in Stata 14.0
may not only have varied effects on employee career development but may also exhibit conflict among themselves. This study has opened up the black box of the ESOP, with in-depth research conducted into the effects that the different dimensions that comprise the core of this type of share-based incentive plan have on employee career development, and unpacked the differences across industries, ownership structures and regions, with the aim of creating a more comprehensive understanding of the relationship between ESOPs and employee career development.

Third, an “odd disconnect” has persisted in past research on employee career development: previous studies have very rarely merged individual career development and organizational development research (Cable and Judge, 1997; Verquer et al., 2003; Krishnan and Maheshwari, 2011). We employed person–organization fit theory as a point of entry to this study on employee career development, exploiting a particular trait of ESOPs, i.e., that they bind together employee and organizational interests, leading both parties to share in risks, and also share in profits. We were therefore able to analyze the influence of ESOPs on employee career development from a perspective that combined both the individual and the organizational.

5.2 Implications and policy recommendations
First, decision makers should take full advantage of the positive benefits ESOPs have to offer for sustainable employee career development. We maintain that the government should encourage listed companies to implement ESOPs in a proactive but orderly manner, encouraging executives to design ESOPs such that funding is sourced from employee compensation and/or employee pooled funds, and shares are sourced from subscriptions to private placements. Furthermore, we encourage firms to increase both the proportion of overall shares designated to ESOPs and the proportion of senior executives holding shares within the plans, in order to take full advantage of the positive effects of ESOPs on sustainable career development for ordinary employees.

Second, policy-makers should take local characteristics into account during their efforts and work to promote ESOPs within the manufacturing industry. This study recommends encouraging manufacturing firms that meet the necessary requirements to increase their pace of adoption of ESOPs, to help promote ordinary-employee creativity, increase employee satisfaction, increase investment in on-the-job training and broaden employee career development paths.

Third, SOEs should accelerate their implementation of ESOPs. The task of transforming manufacturing is even more arduous in SOEs in China. This vast number of SOEs should seize the opportunity before them and learn from non-SOE. On the one hand, the adoption of ESOPs could more effectively solve the problems of low efficiency plaguing SOEs and incentivize employees to better perform their production and management tasks within these firms, which would efficiently curtail problems of incentive incompatibility. On the other hand, ESOPs encourage production workers to meet challenges, improve their vocational skills and enhance their competitiveness, thereby boosting sustainable employee career development.

Fourth, policy-makers should increase their consideration of regional and cultural differences in the implementation of ESOPs. As economic and market awareness is more marked in the south of China, individuals there tend to be more willing to take the initiative, whereas in the north, political awareness has more salience and people tend to take less initiative within their businesses, so the implementation of ESOPs often only follows a change in policy. Because of these differences, pushing for the implementation of ESOPs should take regional characteristics into consideration and different methods should be adopted as necessary, in order to maximize the effects of ESOPs on sustainable employee careers and innovation.
5.3 Limitations and future research

Given considerations regarding access to data, this study used the ESOPs of listed companies as its object of study. In reality, private companies have also seen ample applications of ESOPs, such as at Huawei Technologies Co., Ltd. Therefore, future research could exploit methods such as surveys and interviews to develop investigations into the theory and practice of ESOPs in private firms. Furthermore, the sample used in this study comprised Chinese companies with A-shares that had already announced the adoption of ESOPs during the period of June 2014 to September 2017. This time frame of investigation was rather short, and could potentially give rise to errors within the empirical conclusions. This study can be considered as medium range; academic research tends to consider long-term analysis as transpiring over a period of greater than five years. As a result, future research will also need to consider questions relating to the longer-term effects of ESOPs.

5.4 Conclusions

The empirical findings in this study have shown that ESOPs have a positive impact on employee career development. Furthermore, if the funding for a plan comes from employee compensation or employee pooled funds, and the shares are sourced via subscriptions to private placements, then that plan is even more advantageous for employee career development. Additionally, the greater the proportion of total shares allocated to an ESOP, and the greater the proportion of shares held by senior executives, the better that ESOP is for employee career development. Moreover, the results of the empirical analysis on groups of subsamples show that the adoption of ESOPs is more beneficial to employee career development in manufacturing firms compared with non-manufacturing firms, in non-SOEs compared with SOEs, and in the south compared with the north.

References


Further reading


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Disruptive technologies and career transition strategies of middle-skilled workers

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Abstract

Purpose – Disruptive technologies often disrupt the careers of middle-skilled workers. The purpose of this paper is to investigate career transition strategies of middle-skilled workers that partially continue or expand their careers under the condition of disruptive technologies.

Design/methodology/approach – This paper established a conceptual framework of career transition strategies for middle-skilled workers by integrating the existing studies of disruptive technologies, technological trajectory transition, boundaryless and protean careers, and careers as repositories of knowledge.

Findings – The authors proposed three types of career transition strategies to partially prolong middle-skilled workers’ careers, namely, industry-oriented transition strategy which refers to a transfer to other occupations in the original industry, technology-oriented transition strategy which refers to a transfer to occupations with original technical skills in other industries, and comprehensive transition strategy which refers to a transfer to other occupations in the related industries. Further, this paper discusses the external conditions and individual competencies for each career transition strategy, and timing for implementing a career transition strategy from the perspective of the technology life cycle.

Originality/value – This paper focused on sustainable careers of middle-skilled workers under the condition of disruptive technologies, which received very little attention from the current literature. The findings also suggested for middle-skilled workers to develop a sustainable or long-term career in the current era of many disruptive technologies. The findings may also imply on how firms and government should contribute to help workers on handling scenarios of technological disruption.

Keywords Disruptive technology, Career transition strategy, Middle-skilled worker, Technology life cycle

Paper type Research paper

Introduction

In the current era of the fourth industrial revolution, increasing technological advancements and innovations produce an enormous impact on individuals’ career experiences (Hirschi, 2018). The widespread use of digitalization and automation led to the elimination of thousands of jobs and the fundamental change of many current occupations (Chin and Liu, 2015; Jiao et al., 2016; Wu et al., 2017; Chin and Rowley, 2018; Hirschi, 2018). At the same time, new occupations and new industries emerge (Brynjolfsson and McAfee, 2014; Hirschi, 2018). In US and European labor markets, recent technological progress produces an increasing job polarization, i.e., middle-skilled jobs (e.g. production workers, machine operators and assemblers) which consist of routine, cognitive or manual tasks are hollowed out, whereas lower skilled service jobs (e.g. security guards, personal caretakers and beauticians) which encompass in-person service tasks increase disproportionately, and so do high-skilled jobs (e.g. managers, professionals) which involve creative problem-solving and complex social interaction (Goos et al., 2009; Autor and Dorn, 2013; Hirschi, 2018). In many emerging and
developing countries with a large, labor-intensive manufacturing sector, such as China and India, more and more production workers face difficulties to develop a long-term career path since their jobs are increasing automated (Chin and Liu, 2015; Chin and Rowley, 2018). In summary, the result of recent technological progress is fierce for middle-skilled workers who engage in routine, cognitive or manual jobs, including production and craft occupations, operative and assembler occupations, as well as transportation, construction, mechanical and mining occupations.

Although the current literature paid attention to the influences of technology advancements on individuals’ career development, few studies distinguished disruptive technology advancements from sustaining ones. The main issues of individuals’ careers caused by the two kinds of technology advancements differed essentially. Sustaining technology advancement refers to an improvement or increment to the incumbent technology, which did not relatively impact the current products, markets and value network, whereas disruptive technology advancement corresponds to the case that a new technology in a different technological trajectory replaced the incumbent technology, which often disrupts the current products, markets and value network (Christensen, 1997; Zeleny, 2012; Christensen et al., 2015). Thus, facing with sustaining technology advancements, middle-skilled workers who aim to continue their original careers need to update their knowledge and abilities to catch up with the technology progress and adapt to the changes in job requirements. However, faced with disruptive technology advancements, middle-skilled workers may have no chance to pursue their original careers, because the new disruptive technology compromised their occupations in the original industry. In this case, middle-skilled workers need to carry out a career transition; otherwise, their careers end. In principle, they can work on another occupation in the original industry, a similar occupation in another industry or new occupation in another industry.

Contemporary career literature departed from the complex and continuously changing socio-economic environment (Arthur, 1994; Hall, 1996; Peiperl and Baruch, 1997; Valcour et al., 2005; Van der Heijden and De Vos, 2015; Akkermans and Tims, 2017; Froehlich et al., 2018). Previous research works emphasized employees’ flexibility and autonomy, mobility between and within the organization, and proactive behavior and self-directed approach, through which employees developed employability to adapt to the changing and evolving jobs under the complex changing environment. Contemporary career literature provides insightful frameworks to investigate the career issues of middle-skilled workers derived from disruptive technology advancements. Nevertheless, the existing career theories mainly focused on the continuance and expandability of careers, implicitly assuming that employees prolong their careers along a specific direction within and between organizations. Thus, these theories did not thoroughly address the issues of career transition of middle-skilled workers when they encounter a disruptive technology advancement and must adjust their career development to another direction. To fill this gap, this paper investigated the career transition strategies of middle-skilled workers who face the threat of disruptive technologies by integrating contemporary career theories and the existing studies regarding disruptive technologies.

**Disruptive technologies and careers of middle-skilled workers**

*Disruptive technologies*

Disruptive technologies arrived and will continue occurring with increasing frequency. The examples include electromechanical cash register technology (Foster, 1986a, b), hydraulic excavator technology (Christensen, 1997), digital photography technology (Lucas and Goh, 2009; Weeks, 2015), digital media technology (Waldfogel, 2010), smartphone technology (Sarwar and Soomro, 2013; Weeks, 2015), mobile payment system technology (Schmidhuber et al., 2018) and so forth. With the constant advance of the fourth industrial revolution, more and more disruptive
technologies will emerge from the fields of genetics, artificial intelligence, digitalization, cloud computing and 3D printing (Schwab, 2016).

The term “disruptive technology” was introduced by Bower and Christensen (1995) and extended by several following research works. According to Christensen and his co-authors (Bower and Christensen, 1995; Christensen, 1997; Christensen et al., 2015), a disruptive technology refers to new technology with lower cost and performance measured by traditional criteria, but with higher ancillary performance compared to the incumbent technology. Hence, the disruptive technology enters and expands emerging market niches, improving over time and eventually overriding established products in their traditional markets. However, the central claims of Christensen and his co-authors may not always hold. First, the authors argued that disruptive technologies enter the market from the low-end (Christensen, 1997; Christensen et al., 2015), whereas other literature showed that disruptive technologies also emerged from high-end (Danneels, 2004; Utterback and Acee, 2005). Second, they argued that the leading incumbent firms are less inclined to adopt a new disruptive technology compared with new entrants (Christensen, 1997; Christensen et al., 2015), but other literature pointed out that disruptive technologies may be adopted by incumbent companies as frequently as by new entrants (Sood and Tellis, 2011). Third, Christensen and his co-authors argued that disruptive technologies are often associated with replacing the incumbent leading companies (Christensen, 1997; Christensen et al., 2015). However, other research works showed that the incumbent leading companies might still exist after replacing the old incumbent technology (Cheng et al., 2017). In other words, disruptive technologies may lead to either a high degree of industrial disruption in such way that replaces the incumbent leading companies or low degree of industrial disruption in terms that the incumbent leading firms remain preserved.

In summary, a disruptive technology consists of an emerging technology that develops along a different technological trajectory from the incumbent technology. It presents higher ancillary performance, so that enter or create market niches initially, and by improving over time, it finally dominates the mainstream market. Accordingly, disruptive technology often brings great challenges to incumbent companies, because it stimulates the creation of new product, market and new value network, which prompts a disruption toward the current product, market and value network, and subsequently replaces the incumbent technology. Of note, disruptive technologies are quite different from sustaining ones. A sustaining technology consists of improvement or increment to the incumbent technology, with a relatively small impact in the current product, market and value network.

**Shocks to middle-skilled workers’ careers from disruptive technologies**

With no doubt, since disruptive technologies promote a disruption toward the current product, market and value network, they often bring large shocks to middle-skilled workers’ careers in multiple aspects. Specifically, the shocks can be classified into shock at the industrial, organizational and individual level.

At industrial level, as the new disruptive technology replaces the old incumbent technology, some existing industries shrink or even disappear, and some other new industries emerge at the same time. For example, when liquid crystal display (LCD) technology replaced cathode ray tube (CRT) technology for computers and television sets during the early 2000s, the existing industry of CRT production shrank, and the new industry of LCD production emerged and grew. However, the middle-skilled workers in CRT production industry hardly moved to the LCD production industry or other industries. Thus, structural unemployment arose. Even worse, as higher technologies relative to the old incumbent technologies (Zeleny, 2012), disruptive technologies deepened the job polarization, which led to a contraction of the industrial sector providing middle-skilled jobs and expansions of industrial sectors providing both low-skilled service jobs and high-skilled jobs (Goos et al., 2009; Autor and Dorn, 2013; Hirschi, 2018).
As a result, there must be a portion of middle-skilled workers who would lose their jobs or be forced to find their new jobs in low-skilled service occupations. In summary, from the perspective of industrial level, the main shocks to middle-skilled workers’ careers from disruptive technologies are the reduction of employment opportunities and the change in employment structure.

At organizational level, as the new disruptive technology replaces the incumbent technology, some incumbent leading companies fall or even go bankrupt, and meanwhile, some fringe firms and new entrants rise and seize the market leadership. As Christensen and his co-authors pointed out, the leading incumbent firms may be less inclined to adopt new disruptive technology compared to the fringe firms and new entrants (Christensen, 1997; Christensen et al., 2015). Since the disruptive technology often performs relatively weak in the early stage, the incumbent leading firms prefer to invest in sustaining technology to improve their products and services for the mainstream market, whereas the fringe firms and new entrants tend to adopt and develop the new disruptive technology to gain a foothold in the niche market. However, as the new disruptive technology gradually progresses and finally delivers higher performance than the old incumbent technology, the mainstream consumers start adopting the new disruptive technology, and the replacement of mainstream technology and the transformation of market leadership would occur afterward. For example, the first digital cameras suffered from low picture quality and resolution, as well as long shutter lag. Thus, despite inventing one of the first digital cameras in 1975, the market leader Kodak maintained their investments in traditional roll film. In the early 2000s, after solving the problems of quality, resolution and shutter lag, the digital photography technology replaced the chemical photography technology in several years, which led to the bankruptcy of Kodak in 2012 and the rise of Fuji. Clearly, the drastic falls and rises of companies caused by disruptive technologies would bring a significant shock to middle-skilled workers’ careers. First, the rising firms do not provide sufficient job positions to the middle-skilled workers who lost their jobs in the falling firms. Second, middle-skilled workers who lost their jobs may also encounter difficulties, such as organizational culture difference and workplace changing in the rising firms.

At individual level, as the new disruptive technology replaces the incumbent technology, middle-skilled workers with old incumbent technology may lose their jobs. Even worse, they may lose their employability due to a sharp depreciation of their existing knowledge. First of all, middle-skilled workers’ knowledge of technical skill related to the old incumbent technology becomes useless as a result of the abandonment of incumbent technology. Second, middle-skilled workers’ knowledge about the products also becomes outdated, because the new disruptive technology introduces new products which are quite different from the old ones. Third, their knowledge about the industry may be significantly destroyed, since the new disruptive technology usually brings a new business model and new value network (Zeleny, 2012; Christensen et al., 2015). Fourth, social networks become worthless, since their social networks seldom generate linkages to the new disruptive technology and rising firms.

Technology life cycle and careers of middle-skilled workers

Technology life cycle and technological trajectory transition

Like an organism, a technology experiences a life cycle. The existing literature suggested that the progression of a technology often advances slowly at the beginning, then accelerates and then inevitably declines, thereby conforming to the general form of an S-curve, which plots the change in performance of technology improvement over time (Foster, 1986a, b; Cetindamar et al., 2010; Taylor and Taylor, 2012). According to an illustration of S-curve in Figure 1, the technology life cycle follows four phases: embryonic, growth, maturity and aging phase (Cetindamar et al., 2010; Taylor and Taylor, 2012). In the
phase of embryonic, technology progress is slow as the industry wrestles with uncertainties about the technology; in the phase of growth, technology progress is faster as the technical obstacles were overcome; in the phase of maturity, technology progress slows down as the natural limits of the technology approaches; and in the phase of aging, technology progress remains stagnated.

The notion of technology life cycle helps us better understand the concept of technological trajectory transition, which refers to the case that the mainstream technology in industry changes from a technological trajectory to another one (Dosi, 1982). From the perspective of the technology life cycle, when the old incumbent technology reaches its maturity or aging phase of the life cycle, the technology progress slows or stagnates. Thus, a new disruptive technology with higher potential may emerge and finally replace the old incumbent one, leading to a technological trajectory transition (Foster, 1986a, b; Adner, 2004; Cetindamar et al., 2010). As shown in Figure 2, the solid S-curve represents the life cycle of the old incumbent technology, while the dashed S-curve represents the life cycle of the new disruptive technology along a different trajectory. Once the dashed S-curve crosses the intersection T of the two curves, the new disruptive technology would have a higher performance over the old incumbent one, which often initiated a process of the technological...
trajectory transition. After that, the new disruptive technology began to replace the old incumbent one as the dominant technology in the industry.

Note that although the technological trajectory transition process may be drastic and last only a short time, the new disruptive technology often existed for a long time before the transition process. In other words, from the perspective of technology life cycle, the complete substitution of the old incumbent technology by the new disruptive one could take decades. Specifically, when a new disruptive technology emerged, it often entered the fringe market or created a new market because of its lower performance and lack of ability to compete with the old incumbent one in the mainstream market. However, in time, the progress of the new disruptive technology speeds up, while the progress of the old incumbent technology slows down, so the new disruptive technology gradually invades the mainstream market, and finally initiates a drastic technological trajectory transition process. For example, digital photography technology replaced the chemical photography technology in a few years in the early 2000s, but digital photography technology emerged in the middle 1970s. That is to say, the complete substitution of chemical photography technology by digital photography technology took about 30 years.

Careers of middle-skilled workers in the view of technology life cycle
The careers of middle-skilled workers are closely related to the life cycle of the incumbent technology. As the incumbent technology progresses from embryonic phase to growth phase, and then to maturity phase, the industry and its incumbent firms increasingly grow and expand, which provides many opportunities of promotion for middle-skilled workers in the industry. In contrast, when the technological trajectory transition happens, it leads to a discontinuity in the careers of middle-skilled workers. Fortunately, as mentioned above, the new disruptive technology often appeared a long time before the technological transition, which implies that the middle-skilled workers have enough time to transfer to the new disruptive technology.

However, it might not be a sensible choice for middle-skilled workers to transfer to the new disruptive technology before the technological trajectory transition due to the following reasons. First, there exists a high opportunity cost for middle-skilled workers to transfer to disruptive technology. Before the technological trajectory transition, the industry is dominated by the old incumbent technology, and the established leading firms often provide to middle-skilled workers profitable positions and clear career path. Thus, for middle-skilled workers, the opportunity cost of transferring to the new disruptive technology by abandoning the current occupation is very high. Second, when there are several competing new disruptive technologies before the technological trajectory transition, middle-skilled workers assume considerable risk when selecting one of them. For example, when the CRT technology reached its maturity phase, there emerge two flat-panel display technologies, the LCD and LED technologies. It was hard to predict which flat-panel display technology would replace the CRT technology. Third, middle-skilled workers may not have capabilities to master the new disruptive technology, since the two types of technologies sometimes are quite different. For example, the technology of memory card production is quite different from the technology of roll film production, so middle-skilled workers in film production industry could not probably transfer to memory card production industry, even though they realized that the digital technology would replace the chemical photography.

Therefore, middle-skilled workers are more likely to determine whether to transfer to the new disruptive technology or not during the technological trajectory transition. However, at that time, middle-skilled workers lost the right timing to learn the new disruptive technology. It is worth noting that in addition to transferring to the new disruptive technology, there may be many alternative approaches for middle-skilled workers to deal with the shocks of careers from disruptive technologies.
Contemporary career theories and disruptive technologies

Boundaryless and protean careers

Current research proposed various career theories, including boundaryless career (Arthur, 1994, 2014), protean career (Hall, 1996, 2004), post-corporate career (Peiperl and Baruch, 1997), kaleidoscope careers (Mainiero and Sullivan, 2005), customized careers (Valcour et al., 2005) and sustainable careers (Van der Heijden and De Vos, 2015). These career theories emphasized employees’ flexibility and autonomy, mobility between and within organization, proactive behavior, and self-directed approach, which help employees develop employability for adapting to the complex environment of changing and evolving jobs.

The boundaryless and protean career theories are two of the most prominent frameworks to address the career issues derived from disruptive technologies. Boundary careers refer to career paths that involve sequences of job opportunities that go beyond the boundaries of single employment settings (Arthur, 1994, 2014; Defillippi and Arthur, 1994). In other words, boundary careers break traditional organizational career boundaries, notably hierarchical reporting and promotion principles (Arthur, 1994, 2014). Besides, boundary careers draw validation and marketability from outside and are sustained by extra-organizational networks or information (Arthur, 1994, 2014). Protean careers represent a pursuit of freedom and personal growth, which stresses that the person, and not the organization, is in charge of career development (Hall, 1996, 2004). In the context of disruptive technologies, middle-skilled workers’ careers suffer shocks of careers from individual level to industrial level, and they may be forced to perform a career transition. Thus, organizational boundaries and organization-directed careers diminished in importance for middle-skilled workers. By contrast, taking responsibility for one’s career development and being flexible in terms of transferring one’s job among multiple organizations corresponds to the reality of many middle-skilled workers.

Although the issue of career transition becomes increasingly important for middle-skilled workers, we still lack a better understanding of the impact on contemporary career theories. For example, boundaryless careers emphasize the organizational mobility in order to expand career paths from a single organization to several separate organizations (Arthur, 1994, 2014; Defillippi and Arthur, 1994), which may improve employees’ employability in a volatile economy (Direnzo and Greenhaus, 2011) and produce indirect advantages of specialization as a future career mobility (Ferguson and Hasan, 2013). However, there is no literature regarding boundaryless careers that explicitly account for a career transition. Thus, it remains necessary to extend the notion of boundaryless career under the possibility of career transition. Moreover, protean careers are traditionally described as a pursuit of freedom and personal growth, and personal growth is mainly pursued in career development. Due to uncertainty embed in disruptive technologies, job insecurity is likely to become more widespread, and temporary unemployment may often occur during the period of career transition. Accordingly, values of stability and income might increase in importance of personal growth.

Careers as repositories of knowledge

By borrowing the concepts of syntax and semantics from grammar, Bird (1994) elaborated the difference between structure and content of careers. The syntactic view of careers is concerned with the structure of work experiences, which can be classified in terms of duration, sequence and occupational type. In this point of view, careers correspond to the evolving sequence of work experiences over time (Arthur et al., 1989). However, the semantic view of careers refers to the content and meaning of work experiences. From this perspective, careers are visualized as repositories of knowledge. Specifically, careers accumulate information and knowledge acquired through an evolving sequence of work experiences over time. Bird (1994) argued that although work experiences constitute the
primary mechanism by which careers develop, their accumulated information and knowledge determine the nature or quality of careers.

Traditionally, middle-skilled workers develop their careers in terms of pursuing a higher salary and higher status. However, by seeing their careers as repositories of knowledge, middle-skilled workers should seek opportunities to accumulate knowledge via individual and organizational learning so that they maintain and improve their employability, and then prolong and promote their careers. In addition to being accumulated and improved, knowledge may also be destroyed, removed, modified or replaced. The replacement of old technology by a disruptive technology compromises the knowledge bases of skilled workers, including the knowledge about technical skills, products, industry and social network. Therefore, disruptive technologies produce a discontinuity to the current industry. Nevertheless, middle-skilled workers still guard and preserve their knowledge by carrying out an appropriate career transition. For example, middle-skilled workers can transfer to another industry sharing the old incumbent technology so that they guard and preserve the knowledge of technical skills well at the cost of abandoning the knowledge about the original products, industry and social capital.

Career transition strategies against disruptive technologies: a framework

Career transition strategies

As discussed in detail before, when a new disruptive technology replaces the old one, it compromises the occupations of middle-skilled workers, and, as a consequence, the workers need to carry out a career transition. The career transition does not mean a discontinuity of career, even though middle-skilled workers cannot pursue their original occupations in the original industry. On the contrary, the career transition, in some sense, represents an effective approach to partially continue or expand middle-skilled workers’ careers. The career transition can be regarded as a particular case of a boundaryless career and protean career. Specifically, the career transition means a career movement not only across the boundary of separate organizations but also the boundary of different industries and different occupations.

Moreover, the career transition is more likely to be a horizontal transfer of career, which may not bring personal growth in terms of vertical promotion. Thus, the personal growth might be increasingly pursued in family role or other non-work roles, and the values of stability and income might increase in importance. From the perspective of knowledge, the career transition should help middle-skilled workers to guard and preserve their existing knowledge as much as possible. In summary, following the notions of boundaryless career, protean career considers the career a repository of knowledge. Based on that, we propose three types of career transition strategies, illustrated in Figure 3.

**Figure 3.** Career transition strategies

<table>
<thead>
<tr>
<th>Original technology</th>
<th>Original occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry-oriented transition strategy</td>
<td></td>
</tr>
<tr>
<td>Technology-oriented transition strategy</td>
<td></td>
</tr>
<tr>
<td>Other technologies</td>
<td>Other occupations in original industry</td>
</tr>
<tr>
<td>Other industries</td>
<td>Similar occupation in other industries</td>
</tr>
<tr>
<td></td>
<td>Other occupations in related industries</td>
</tr>
</tbody>
</table>
Industry-oriented transition strategy. Middle-skilled workers continue and expand their careers in the original industry by transferring to other occupations, which can be more or less related to the new disruptive technology. For example, when the replacement of CRT technology by LCD technology disrupts the occupations of CRT production, the CRT production workers can transfer to the occupations of LCD production which is closely related to LCD technology or TV sets assembly which is less related to LCD technology. By adopting this type of career transition strategy, middle-skilled workers guarded and preserved their knowledge about the original industry and the social network within the original industry, but they should abandon their original technical skills and need to learn some new technical skills.

Technology-oriented transition strategy. This strategy relies on using the worker’s original technical skills by transferring to similar occupations in other industries. For example, when the replacement of chemical photography technology by digital photography technology disrupted the occupations of roll film production, the roll film production workers in the camera industry can transfer to the occupations of optical thin film production in the panel display industry, since the roll film production and optical thin film production share the same core technology. By adopting this type of career transition strategy, middle-skilled workers guard and retain much of their knowledge, but they may abandon their knowledge about the original firm and industry, as well as the social network within the original firm and industry.

Comprehensive transition strategy. By using this strategy, middle-skilled workers continue and expand their careers by transferring to other occupations in the related industries, including the upstream and downstream industries, especially the downstream service industries. This type of career transition strategy forced middle-skilled workers to abandon their knowledge about technical skills, the original industry and social network to a great extent. However, they are still able to make use of their existing knowledge to learn the new knowledge in these related industries and accommodate the new occupations. For example, when middle-skilled workers transfer to the downstream service industries, they take advantage of their knowledge about the technique and products to provide professional sales services.

Conditions for implementing career transition strategies
From the perspective of knowledge, the industry-oriented transition strategy and technology-oriented transition strategy are the preferred choices, because they preserve more knowledge for middle-skilled workers than the comprehensive transition strategy. However, the implementation of career transition depends not only on the decisions and actions of middle-skilled workers but also on the external environment around them. Thus, it is worthwhile to discuss the conditions for middle-skilled workers to complement the above career transition strategies.

Industry growth and the degree of industrial disruption play a significant role in the implementation of the industry-oriented transition strategy. In the case that the original industry is in period of high growth or the new disruptive technology produces a significant industry expansion, the original industry continually generates new positions in various occupations, thereby providing abundant positions in other occupations for the middle-skilled workers whose occupations were disrupted by the new disruptive technology. Otherwise, these middle-skilled workers encounter few opportunities to implement the industry-oriented transition strategy. As Cheng et al. (2017) pointed out, disruptive technologies may lead to high degree or low degree of industrial disruption. In the case of low degree of industrial disruption, the incumbent leading firms remain preserved, so the middle-skilled workers whose occupations were disrupted easily find job opportunities of other occupations in the original
industry through their existing social network. Otherwise, these middle-skilled workers may face more difficulties to find employment opportunities from emerging firms. To sum up, in the case that the original industry is still growing and the new disruptive technology produces a low degree of industrial disruption, the middle-skilled workers have more chances to implement the industry-oriented transition strategy.

For the implementation of the technology-oriented transition strategy, the applied scope and diffusion trend of the old incumbent technology also should receive attention. Generally speaking, new technology seldom replaces old technology in all industries. For example, digital technology disrupted roll film technology as a new storage technology of photography, but it did not disrupt the optical thin film technology as a new display technology. Therefore, in the case that the old incumbent technology is applied in lots of industries or is diffused to other industries, even though middle-skilled workers’ occupations are disrupted by new disruptive technology in the original industry, they still find many chances to pursue similar occupations in other industries that share the same technology.

The comprehensive transition strategy is a suboptimal choice compared to the other two transition strategies since the middle-skilled workers need to abandon more existing knowledge. Therefore, the worker should select a comprehensive transition strategy only when unable to implement industry-oriented and technology-oriented transition strategies. Specifically, in the case that there is low or no industry growth and a high degree of industrial disruption, and the old incumbent technology has small applied scope and stop diffuse, middle-skilled workers should seek opportunities to carry out the comprehensive transition strategy. Figure 4 summarizes the conditions for implementing each career transition strategy. We highlight that there might be some middle-skilled workers who cannot implement career transition strategies so that they are forced to accept the reality of career discontinuity or unemployment.

**Competencies supporting career transition strategies**

The implementation of career transition strategies requires appropriate individual competencies. According to Defillippi and Arthur (1994), individual competencies are classified into three types, namely, know-why, know-how and know-whom competence. Know-why competency reflects individual identity and motivation, personal meaning, and identification with one’s job. Know-how competency represents individual skills, specialties and abilities relevant to the job. Know-whom competency refers to the interpersonal relationships and social networks that are important for the work.

We first discuss know-why competency. Traditionally, middle-skilled workers develop organizational careers, so their know-why competencies are employer dependent.
However, when middle-skilled workers need to carry out a career transition, their know-why competencies should be employer independent instead. The career transition often refers to a career movement across the boundaries of different organizations, industries and occupations. Thus, the employer-dependent individual identity, such as organizational loyalty, tends to hinder the implementation of career transition. In addition to employer independent, the individual identity should also be industry independent and occupation independent, i.e., middle-skilled workers need to realize that they belong to neither a specific industry nor a specific occupation, which support them to transit to another industry or another occupation.

Moreover, the career transition is more likely to be a horizontal transfer or even a retrogression of career, rather than a vertical promotion of career. Thus, middle-skilled workers might be a lack of motivation to carry out the career transition. Alternatively, middle-skilled workers could develop personal meaning from job security, stable income and non-work roles, which provides incentives for the career transition.

We then move to discuss know-how competency. Traditionally, middle-skilled workers concentrate on a specific occupation, and their know-how competencies are reflected in the depth of their knowledge accumulation, i.e., the specialization of the corresponding technical skills and work tasks. The specialization of technical skills and work tasks enable middle-skilled worker to promote within an organization. When considering the career transition, middle-skilled workers need to enhance the breadth of their knowledge accumulation, i.e., the diversity and applied scope of the variety of their technical skills. The diversity of technical skills enables middle-skilled workers to be competent for multiple occupations in an industry, and the widely applied scope of a technical skill enables middle-skilled workers to be qualified for similar occupations in multiple industries. Thus, the breadth of their knowledge accumulation improves middle-skilled workers’ capabilities to implement the career transition strategies. It is worth mentioning that there is a tradeoff between the breadth and depth of knowledge accumulation.

We finally discuss know-whom competency. For the traditional organizational career, middle-skilled workers may only need to develop an intra-organizational and hierarchic social network. Social network often plays a minor role in the traditional organizational careers of middle-skilled workers, since they work in a relatively narrow field. On the contrary, the social network plays a key role in the career transitions of middle-skilled workers. On the one hand, social network is an important channel for acquiring knowledge about various technical skills and other industries, as well as the information of job opportunities from other organization in the current industry and other industries. Therefore, when considering the career transition, middle-skilled workers need to develop inter-organizational, inter-industrial and non-hierarchic social network, which may also involve the private relationship with friends and relatives.

Table I summarizes the competencies that support the industry-oriented transition strategy, technology-oriented transition strategy and comprehensive transition strategy.

<table>
<thead>
<tr>
<th>Competency</th>
<th>Industry-oriented transition strategy</th>
<th>Technology-oriented transition strategy</th>
<th>Comprehensive transition strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know-why</td>
<td>Employer- and occupation-independent identity; motivated by security, income and non-work roles</td>
<td>Employer- and industry-independent identity; motivated by security, income and non-work roles</td>
<td>Employer-, industry- and occupation-independent identity; motivated by security, income and non-work roles</td>
</tr>
<tr>
<td>Know-how</td>
<td>Diversity of technical skills</td>
<td>Wide applied scope of technical skills</td>
<td>Diversity and wide applied scope of technical skills</td>
</tr>
<tr>
<td>Know-whom</td>
<td>Inter-organizational and non-hierarchic social network</td>
<td>Inter-organizational, inter-industrial and non-hierarchic social network</td>
<td>Inter-organizational, inter-industrial and non-hierarchic social network</td>
</tr>
</tbody>
</table>

Table I. Competencies supporting career transition strategies
Timing for carrying out career transition strategies

The timing for carrying out the career transition strategies is a crucial issue, which largely depends on when the technological trajectory transition happens. In terms of theory, the worker should focus on career transition strategies just before the technological trajectory transition happens so that they obtain as much benefit as possible from the original occupation and avoid the shocks from the new disruptive technology. However, in the real world, it is difficult to predict the time when the technological trajectory transition happens. Sometimes, middle-skilled workers may not even identify new disruptive technology. Therefore, it is more realistic to conduct a career transition strategy when they have just recognized the occurrence of technological trajectory transition.

Alternatively, middle-skilled workers can also carry out a career transition strategy before the technological trajectory transition according to the life cycle phase of the old incumbent technology and their perception of the threat from the new disruptive technology. It is relatively easy for middle-skilled workers to recognize the life cycle phase of the old incumbent technology. When the old incumbent technology is in the embryonic or growth phase, middle-skilled workers should not carry out any career transition strategy even though they recognize a new disruptive technology. This is because the old incumbent technology often progresses faster than the new disruptive one, and thereby the old incumbent technology would dominate the industry for a relatively long time. When the old incumbent technology reaches the maturity and aging phase, middle-skilled workers should begin a career transition strategy if they perceive substantial threat from the new disruptive technology. The progression of old incumbent technology slows down or stagnates, and the firms with old incumbent technology often begin to decline in profits, and worse yet, the old incumbent technology might be replaced by the new disruptive one suddenly with a high possibility. Thus, in that case, it is sensible for middle-skilled workers to avoid the shocks from the new disruptive technology in advance by implementing a career transition strategy.

It is unavoidable that some middle-skilled workers cannot carry out a career transition until the replacement of technologies happens, since they do not identify the new disruptive technology, nor perceive the threat from the new disruptive technology, nor adequately evaluate the impact of disruption imposed by the new disruptive technology.

Practice implications

Implication for middle-skilled workers

This paper proposed a conceptual framework of career transition strategies against disruptive technologies, including the types of transition strategies, and the external conditions, individual competencies and timing for implementing transition strategies. Our framework enables middle-skilled workers to develop a career transition strategy suitable for themselves and help them partially continue and expand their career when they encounter disruptive technologies. Industry-oriented and technology-oriented transition strategies should be priority choices since they lead abandonment of less knowledge compared to the comprehensive transition strategy. However, industry-oriented and technology-oriented transition strategies require quite different individual competencies, so each middle-skilled worker should choose to develop only one of them according to their condition.

The individual competencies for career transition strategies and that for traditional organizational careers are of essential differences. Thus, when middle-skilled workers develop individual competencies for career transition strategies, they develop a new kind of career instead of organizational career. This new kind of career moves across the boundaries of separate organizations within an industry or among multiple industries, so it belongs to boundaryless and protean careers to some extent. Middle-skilled workers need to realize that they can cope with the shocks from disruptive technologies by developing a
flexible career, which mainly consists of horizontal transfers among multiple industries and multiple occupations, at the cost of giving up the opportunities of vertical promotion.

Besides, middle-skilled workers also need to increase their transfer of learning. Transfer of learning refers to knowledge being applied in new ways, in new situations or familiar situations with different context (Ormrod, 2004). There are different types of transfer. One distinction is between near and far transfer of learning (Royer, 1986). Near transfer of learning occurs when situations overlap a great deal.

In contrast, far transfer of learning involves a transfer situation much different from that in which original learning occurred. Another distinction is between vertical and horizontal transfer of learning. Vertical transfer of learning refers to the case that knowledge of a previous topic is essential to acquire new knowledge. Horizontal transfer of learning refers to the case that knowledge of a previous topic is not essential but helpful to learn a new topic (Ormrod, 2004). When skilled workers carry out the career transition strategies, they need to apply their existing knowledge to an unfamiliar industry or learn new knowledge of different technology. Therefore, they need to develop and improve their abilities of far and horizontal transfer of learning.

Implication for firms and government
Our paper also showed a significant practical implication for firms that face with disruptive technology and the government, since the firms and government have motivation and more resources to deal with disruptive technologies.

As mentioned before, new disruptive technologies often bring great challenges to the incumbent firms, because they stimulate the creation of new products, markets, and new value networks, and replace the old ones. In order to accommodate such drastic changes in technology, product, market, value network and business model, the incumbent firms should carry out an organizational transition. Accordingly, the incumbent firms require their employees to have flexible and dynamic capabilities so that they can perform the corresponding career transitions. Our research shows that, first of all, the incumbent firms should provide to their employees more resources and opportunities to learn new technologies and enrich skill diversity of technical skills, rather than improve their core capabilities. Moreover, the incumbent firms should help their employees develop a flexible or individual career, which attaches more importance to personal growth, work stability, income and value in non-work roles, rather than organizational authority and hierarchy.

Since disruptive technologies will appear with increasing frequency in the era of the fourth industrial revolution, the career transition of middle-skilled workers is likely to be a national problem for the government. If lots of middle-skilled workers cannot successfully implement career transition when they encounter disruptive technologies, it may give rise of large scale structural unemployment, and further leads to various social problem. Therefore, the government should adjust the vocational education and labor policy according to the requirement of career transition.

Conclusions
This paper investigated the career transition strategies of middle-skilled workers who face the threat of disruptive technologies by integrating contemporary career theories and the existing studies regarding disruptive technologies. After elaborating the characteristics of disruptive technologies, the shocks to middle-skilled workers’ careers from disruptive technologies, and reviewing the related contemporary career literature, this paper proposed a conceptual framework of career transition strategies against disruptive technologies. We included the types of transition strategies, and the external conditions, individual competencies and timing for implementing transition strategies. Specifically, this paper proposed three career transition strategies. If the original industry is still growing and the
new disruptive technology produces a low degree of industrial disruption, middle-skilled workers should carry out an industry-oriented transition strategy and transfer to other occupations in the original industry. If the old incumbent technology has applications in lots of industries or is diffused in other industries, middle-skilled workers should carry out a technology-oriented transition strategy and transfer to occupations with original technical skills in other industries. When middle-skilled workers are unable to implement the above transition strategies, they should seek a comprehensive transition strategy and transfer to other occupations in the related industries. The implementation of career transition strategies requires appropriate individual competencies, which are characterized by employer, industry and independent occupation identity, diversity and wide applied scope of technical skills, inter-organizational, inter-industrial and non-hierarchic social network.

Our major contributions were divided into the following topics. First, we elaborated the shocks to middle-skilled workers’ careers from disruptive technologies in various aspects. Second, we established a conceptual framework of career transition strategies against disruptive technologies, which may enable middle-skilled workers to develop suitable career transition, and then partially continue and expand their careers. However, the validity of the conclusions requires further examinations on case studies and/or empirical studies.

References


Further reading


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Ambidextrous workforces for managing market turbulence

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Abstract

Purpose – The purpose of this paper is to provide evidence regarding the contributions of ambidextrous workforces as a source of value for dynamic companies and organizations facing emerging market turbulence.

Design/methodology/approach – Using structural equation modeling, the paper analyses the data collected via a semi-structured questionnaire administered to a sample of 1,227 employees from 37 Italian small- to medium-sized enterprises to investigate the effect on companies’ economic performance of ambidextrous workforce-related elements such as study background, previous work experience, work flexibility and soft capabilities.

Findings – The research shows that multidisciplinary human resources’ study background, previous human resources’ work experience and human resources’ soft capabilities are positively linked to companies’ return on sales, providing indirect evidence about the role of ambidextrous workforces in supporting companies facing emerging market turbulence.

Originality/value – The research demonstrates the relevant role of human resources in supporting companies to better align themselves to the emerging social and economic variety.

Keywords Human resource management, Training and education, Ambidextrous workforces, Challenging environment, Soft capabilities, Work flexibility

Paper type Research paper

Introduction

As underlined by Sethi et al. (2016), the market is changing from both structural and dynamic perspectives. Accordingly, consolidated managerial approaches are increasingly unable to explain ongoing dynamics, and they seem unable to support researchers and practitioners in forecasting possible coming changes (Del Giudice et al., 2016; Tidd, 1997; Tronvoll et al., 2017).

Recognizing the validity of this general observation, several researchers and practitioners have tried to study market changes with the aim of providing possible innovative interpretational frameworks (Anderson et al., 2014; Calabrese et al., 2017) to identify new key variables on which to focus (Caputo, Carrubbo and Sarno, 2018; Del Giudice and Della Peruta, 2016; O’Riordan and Fairbrass, 2014) and to depict hypothetical managerial models able to better support companies in aligning themselves to the emerging social and economic scenario (Caputo, 2017; Caputo, Walletzky and Štěpánek, 2018; Del Giudice and Maggioni, 2014).

Among the multiple managerial contributions regarding how companies can manage emerging market turbulence, interesting stimuli for reflections can be found in studies rooted in the framework of human resource management (HRM) (Bratton and Gold, 2017; Brewster, Chung and Sparrow, 2016; Brewster, Mayrhofer and Morley, 2016). Building upon the traditional view of human resources as a part of production processes (Kneese et al., 2015), several authors have proposed preliminary reflections on the possibility for human resources to act as “key resources” in determining companies’ plans (Snell et al., 2015), vision
Recognizing the relevance of human resources in managerial processes (Tukker and Tischner, 2017), the need emerges to understand their potential, and effective, role in helping companies to understand and manage increasing social and economic turbulence (Di Nauta et al., 2018). From this perspective, the following research question can be formulated:

**RQ1.** In which ways can human resources support companies in better facing market turbulence?

Many of the previous managerial contributions addressing this question, however, have approached human resources as elements that play a part in implementing companies’ strategies without considering their features, willingness or expectations (Aswathappa, 2005). This approach seems to be unable to enhance the potential contributions of human resources in supporting companies to better face market turbulence (Cardon and Stevens, 2004).

To bridge this gap in literature, Caputo et al. (2016) emphasized that human resources can be considered as a sort of “filter” through which companies can better understand social dynamics, while Saviano, Polese, Caputo and Walletzky (2017) hypothesized that human resources, acting both as parts of the companies and as market actors, can support companies in defining interpretation schemes able to better explain emerging market dynamics.

In such a vein, interesting reflections can be developed about human resources and their possible contributions to companies’ performance (Del Giudice et al., 2018). The ability of human resources to understand market dynamics can be considered a relevant pillar that supports companies in their struggle for survival (Chen and Miller, 2015) when human resources are endowed with the required competences and capabilities (Helfat and Martin, 2015). With reference to this latter point, it is possible to state that, to manage emerging market dynamics, companies must have ambidextrous workforces as a set of human resources able to perceive and understand social and economic dynamics from several points of view, to adapt themselves to the emerging dynamics, and to summarize social and economic trends in guidelines and behaviors to support companies in adapting their strategies to market needs and expectations. According to Lepak and Snell (1999), human resources are able to perceive market turbulence and adapt themselves to the changing social and economic dynamics, which could support companies in defining more competitive strategies and plans. Similarly, Birkinshaw et al. (2016), through their definition of ambidexterity, emphasized the need for increasing companies’ ability to adapt themselves to market dynamics. Following this assumption, the paper aims to investigate the following research questions:

**RQ2.** How can companies increase their ambidexterity through human resources?

**RQ3.** How could ambidextrous workforces affect companies’ economic performance?

To provide possible answers to the above-mentioned research questions, this paper develops a possible theoretical framework, rooted in the research streams related to the HRM, to identify possible variables that describe key features of ambidextrous workforces. The relationship between the identified key features of ambidextrous workforces as independent variables (IVs) and companies’ economic performance is then investigated using structural equation modeling (SEM) on data collected via a semi-structured questionnaire administered to a sample of 1,227 employees from 37 Italian small- to medium-sized enterprises (SMEs). Return on sales (ROS) was used as the IV for companies’ economic performance as evidence of companies’ ability to understand market expectations and provide suitable answers to market requests (Babin and Zikmund, 2015).
Through the summarized research approach, the paper aims to investigate the role of human resources in affecting companies’ performance as a consequence of their ability to comprehend market dynamics and adapt themselves (including structure and processes) to the ongoing dynamics. In this vein, the rest of paper is structured as follows. The “Theoretical background” section provides the conceptual umbrella under which the reflections herein are based, culminating in four hypotheses being proposed. The “Method” section presents the research process and method. The results of the study are presented in the “Findings” section and further analyzed in the “Discussions” section. Finally, the “Conclusions, limitations, implications, and future directions for research” section summarizes the key elements of the research, underlines the limitations of the research, and outlines its implications, and highlights directions for further research.

Theoretical background
Interest in human resources in the managerial domain has a long history and has been affected by multiple changes that have influenced social and economic dynamics (Wilton, 2016). Although the topic of human resources has attracted the interest of several disciplines, such as psychology (Albrecht et al., 2015), sociology (Storey, 2014) and marketing (Brewster, Houldsworth, Sparrow and Vernon, 2016), only in the past 20 years has a comprehensive research stream been developed, under the banner of HRM, as a complex set of approaches, models and guidelines dedicated to enhancing the contributions of human resources to companies’ achieving their aims and goals (Bratton and Gold, 2017).

Among the multiple changes that have influenced managerial studies concerning human resources, the most challenging debate has centered around the shift from a reductionist to a holistic view of human resources (Tan, 2014). Specifically, the “industrial approach” was oriented to consider human resources as elements of the production processes that can be standardized and managed in the light of quantitative maximization (Collings et al., 2018). In such a view, little attention was paid to the features of human resources, to their competences or to the way in which they can support companies’ strategies and actions beyond the boundaries of production processes (Caputo and Evangelista, 2019).

Only in recent years have research studies in the human resources domain developed a holistic approach, interested in analyzing and understanding in depth the elements that affect the productivity, engagement and efficiency of employees (Hecklau et al., 2016; Kramar, 2014). Accordingly, HRM is expanding upon previous approaches in the study of human resources with the aim of decoding possible ways through which human resources can become a “key resource” able to ensure competitive advantages for companies. In this vein, several contributions have been provided regarding the multiple levels that affect human-resource performance and ability (Ployhart et al., 2014; Rothwell et al., 2018), and a large part of these contributions has highlighted the need for increasing the flexibility of human resources as a way to support companies in better reacting to the ongoing social and economic “revolution” (Bal and De Lange, 2015).

Unfortunately, the managerial contributions focusing on understanding the need for increasing flexibility in managing human resources as a way to enhance the potential contributions of employees to support companies on defining strategies, paths and behaviors able to better face social and economic turbulence seems not to be organized in a cohesive way (Noe et al., 2006). With the aim of systematizing previous contributions on the topic, the concept of ambidextrous workforces could be defined as a general umbrella for clarifying the possible contributions of human resources in supporting companies in better managing market variety.

Building upon previous contributions regarding the need to increase flexibility in HRM (Delaney and Huselid, 1996), Figure 1 depicts the concept of ambidextrous workforces and their possible pillars, such as education/training, work experience, work flexibility
and soft capabilities. These pillars will subsequently be analyzed to clarifying their role in ensuring human resources’ contributions to companies’ ability to face market turbulence.

The pillars of ambidextrous workforces in Figure 1 are derived from the study of consolidated managerial and organizational contributions rooted in HRM (Kramar, 2014; Noe et al., 2006; Ployhart et al., 2014; Tan, 2014). These pillars have been identified by previous studies as relevant drivers of human resources’ influence on companies’ performance (Analoui, 2017; Coşar et al., 2016; Goetsch and Davis, 2014; Russell et al., 2016). Specifically, Sorge (1991) showed that human resources’ education/training influences companies’ ability to identify profitable market segments, Schuler and Jackson (1987) demonstrated that human resources’ work experience is strongly related to companies’ performance in terms of total amount of products and services sold, Pfeffer (1994) asserted that human resources’ work flexibility increases companies’ ability to respond quickly to market demands with a positive influence on their revenues, and Zahra et al. (2006) emphasized the role of human resources’ soft capabilities in increasing companies’ ability to better evaluate market dynamics and to define strategies that increase the total amount of products and services sold. Therefore, by summarizing and systematizing all these contributions, it is possible to state that the pillars depicted in Figure 1 can influence companies’ performance in terms of ROS.

**Hypotheses development**

In the field of HRM, the pillar of education/training is one of the most debated (Hughes and Weisbrod, 2016; Wilson, 2012). Within this domain, Leberman and McDonald (2016) have offered broad insights into the levers that act to increase the efficiency of education and training programs for human resources, while Goetsch and Davis (2014) have underlined the need for a radical change in the traditional approaches to the education and training of human resources with the aim of improving their decision-making abilities. Among the many studies focusing on the education/training of human resources, relevant attention has also been paid to the ways in which human resources can affect companies’ performance (Alvesson and Sveningsson, 2015). In this vein, Paillé et al. (2014) have demonstrated the correlation among study levels of human resources and companies’ economic performance, while Saviano, Barile, Spohrer and Caputo (2017) have pointed out the multiple advantages for companies related to the combination of human resources’ study programs as a part of companies’ structures and plans.
Analyzing these contributions in the light of the increasing need for the flexibility of human resources required by the emerging market configurations, the relevance of multidisciplinarity in human-resource study programs emerges as a possible way to ensure a better combination of human resources’ individual contributions to the achievement of companies’ goals (Katzenbach and Smith, 2015). This multidisciplinary nature of human resources’ study background can be considered a source of value for companies interested in understanding emerging market dynamics ahead of their competitors to define market proposals able to better satisfy market expectations and needs. Accordingly, the multidisciplinarity of human resources’ study background could positively influence companies’ ROS by improving companies’ ability to provide products/proposals/services able to match market expectations. In light of this, this paper aims to verifying the validity of the following hypothesis:

**H1.** There is a positive relationship between human resources’ multidisciplinary study background and companies’ ROS.

As underlined by Russell et al. (2016), another dimension able to support work flexibility is related to the previous work experience of human resources. Felício et al. (2014) stated that human resources with previous work experiences can better support companies in defining strategies able to exploit emerging market opportunities. Similarly, Helfat and Martin (2015) demonstrated that human resources with relevant previous work experience can positively influence companies’ economic performance, while Albrecht et al. (2015) emphasized that a positive relationship exists between human-resource work experience and companies’ productivity. Recognizing the validity of all these contributions, the possibility emerges for considering the previous work experience of human resources as a source of value for companies interested in exploiting emerging market opportunities (Quiñones et al., 1995). It is possible, therefore, to imagine that the previous work experiences of human resources could positively influence companies' ability to understand and satisfy emerging market needs with a positive impact on their ROS. The paper formulates, therefore, the following hypothesis:

**H2.** There is a positive relationship between human resources’ previous work experience and companies’ ROS.

Moreover, previous studies regarding HRM have demonstrated that it is possible to define work flexibility as the ability of human resources to manage several elements that are not strictly related to their specializations (Cöşar et al., 2016). In such a view, work flexibility is considered as tangible evidence of the ability of human resources to support companies’ strategies and actions (George, 2015). Specifically, Marchington et al. (2016) demonstrated that human resources' work flexibility directly affects companies’ economic performance, while Birkinshaw et al. (2016) underlined that a high level of work flexibility improves companies' ability to exploit emerging opportunities with a positive impact on companies' economic performance. In light of the above-mentioned contributions regarding work flexibility within the HRM field, it is possible to state that work flexibility positively influences companies’ ROS as a consequence of human resources’ ability to rapidly align themselves to the changing market demands. Accordingly, the paper aims to verify the following hypothesis:

**H3.** There is a positive relationship between human resources’ work flexibility and companies’ ROS.

Finally, managerial contributions concerning human resources consider soft capabilities (those able to effectively combine knowledge from different fields to build shared approaches and tools) as one of the most necessary features for the “new generation” of human resources (Analoui, 2017; Finch et al., 2016; Mayo, 2016). Soft capabilities are not strictly related to the management of specific fields and/or problems, referring rather
to the ability to observe dynamics using different perspectives that are useful for building innovative solutions (Barile et al., 2018). Barile et al. (2015) demonstrated that soft capabilities improve human resources’ ability to understand their contribution to companies’ dynamics, while Del Giudice et al. (2017) emphasized how soft capabilities support human resources in defining more efficient strategies and market approaches. Reflecting on these contributions regarding soft capabilities within the HRM field, the possibility emerges to consider them as elements able to influence companies’ ability to satisfy market needs and expectations. This paper, therefore, asserts that human resources’ soft capabilities can positively influence companies’ ROS as a consequence of their contributions in shaping companies’ strategies to be better aligned to emerging social and economic dynamics. Accordingly, the paper formulates the following hypothesis:

\[ H4 \text{. There is a positive relationship between human resources’ soft capabilities and companies’ ROS.} \]

Method
This paper adopts a quali-quantitative research approach (Scheurich, 2014). A semi-structured survey composed of 20 questions was used to collect information from a sample of 318 human resources from 37 Italian SMEs located in the Campania Region. The request for collaboration on the research was sent to 73 Italian SMEs located in the Campania Region using official e-mail contacts available on the AIDA Database Version 2018 (https://aida.bvdinfo.com/). The sample was chosen through a random selection of 20 percent of the 352 Italian SMEs located in the Campania Region with a high impact (more than 30 percent) of human resources’ costs on the total business costs.

This choice was motivated by the aim to focus attention, in this phase of the research, on companies for which human resources represented a substantial proportion of production costs and, for this reason, should be more interested in maximizing their contributions to their company’s economic performance.

In answer to the request for research collaboration, 37 Italian SMEs located in the Campania Region declared their willingness to be part of the research, providing a mailing list of 1,863 employees. The structured questionnaire was submitted via e-mail, using the mailing list provided by the companies’ human-resource managers. From March to August 2018, 1,227 employees completed the questionnaire (response rate: 64 percent) and their key features are reported in Table I.

The structured questionnaire was designed to acquire information about the IVs under study as summarized in Table II.

The questionnaire was designed so that the answers to the questions related to the variables “multidisciplinary human resources,” “study background” and “human-resource work experience” could be only numeric values and, for these IVs, the value was defined as the sum of the answers provided by the respondents.

For the variables “Human resources’ work flexibility” and “Human resources’ soft capabilities,” a seven-point Linkert-type scale (Norman, 2010) was used (1 = “strongly disagree” to 7 = “strongly agree”). For these IVs, the value was defined as the sum of the answers provided by the respondents.

The research considered companies’ ROS as a dependent variable (DV) because it is one of the most tangible proofs of companies’ ability to adapt their strategies to market needs and changes (Bresciani et al., 2016; Giacosa, 2015; Giacosa and Mazzoleni, 2012, 2017, 2018; Zhu, 2014). Data on companies’ ROS referred to 2017 and were collected from the AIDA Database Version 2018 (https://aida.bvdinfo.com/).

Using the data collected, the hypotheses detailed in Table III were tested via SEM using IBM SPSS Statistics Version 24.
The hypotheses under study were analyzed using SEM because it is “a collection of statistical techniques that allow a set of relationships between one or more independent variables (IVs), either continuous or discrete and one or more dependent variables (DV), either continuous or discrete, to be examined” (Ullman and Bentler, 2012, p. 661). The choice to use SEM was related to the possibility of performing “a series of multiple regressions [through] a test of the overall model fit” (Savalei and Bentler, 2006, p. 339). According to MacCallum and Austin (2000), before conducting the test via SEM, the relations among the variable must be analyzed to test for possible common bias. Harman’s single factor test was conducted and indicated an explained variance of 32.23 percent, providing evidence about the absence of common method bias (Malhotra et al., 2006).

Finally, the conceptual model of the research was defined (see Figure 2) and several indices were measured to verifying the fitness of the model.

Findings
The reliability of the data collected through the questionnaire was verified using Cronbach’s α coefficients with reference to all the IVs. According to Nunnally (1978), a Cronbach’s α equal to or higher than 0.7 can be considered suitable in cases of applied research, while a Cronbach’s α equal to or higher than 0.6 is suitable for exploratory research (Hair et al., 2012).

At the same time, the construct validity was analyzed by measuring convergent validity and discriminant validity. Convergent validity was measured by calculating the average variance extracted (AVE) while discriminant validity was verified by comparing the square roots of AVE coefficients to the correlations between constructs.

As reported in Table IV, all Cronbach’s α coefficients exceeded the cut-off value of 0.7, the AVE values were over the conventional threshold of 0.50 (Hair et al., 2011), and the square roots of the AVEs were all greater than their respective relationships, providing solid evidence for reliability and discriminant validity of the data collected.

Having verified the convergent validity and the discriminant validity, the hypotheses under study were tested using SEM (IBM SPSS Statistics Version 24) and the results are reported in Table V. According to these results, it is possible to state that $H1 (\beta = 0.680,$
<table>
<thead>
<tr>
<th>Variables</th>
<th>Brief description</th>
<th>Questions for survey</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multidisciplinary human resources' study background</td>
<td>Multidisciplinary human resources' study background refers to the information and schemes acquired and developed by human resources thanks to education and training programs. Specifically, this variable tries to quantify the multidimensionality of human resources' knowledge.</td>
<td>How many study programs have you followed in your life? How many different topics have you studied in your life? How many specializations do you have? How many business sectors have you analyzed in your life?</td>
<td>Becker and Gerhart (1996), Gupta and Singhal (1993), Delaney and Huselid (1996)</td>
</tr>
<tr>
<td>Human-resource work experience</td>
<td>Human-resource work experience refers to the engagement of human resources in work processes as a way of acquiring technical knowledge and competences. Specifically, this variable aims at quantifying previous work experience as a path to measure indirectly the potential contribution of human resources in understanding and managing environmental turbulence.</td>
<td>How many years have you worked? Have many years have you worked in the same business sector with the same role? For how many companies have you worked? In how many business sectors have you worked?</td>
<td>May et al. (2004), Noe et al. (2006), Xanthopoulou et al. (2009)</td>
</tr>
<tr>
<td>Human resources' work flexibility</td>
<td>Work flexibility is the willingness and the availability of human resources to contribute to companies' processes in ways not directly related to their jobs. Through this variable, the paper aims to quantify the possibility for companies to engage available human resources in several processes required by the dynamic evolution of social and economic configurations.</td>
<td>I am available to manage multiple tasks not directly related to my role I am interested in knowing the multiple activities that compose the business activities of the company for which I work I work in different processes for my companies not related to the same topic (product, business area, etc.) I try to manage all the dimensions of business processes in which I am involved, including researching data not directly related to my role I am more interested in understanding the reasons of a problem than simply applying solution techniques I try to support information sharing with and among my colleagues Usually I perform my job, while also considering its social implications I try to build conditions for reciprocal understanding with my colleagues focusing my attention on their character traits</td>
<td>MacDuffie (1995), Cardon and Stevens (2004), Michie and Sheehan (2005)</td>
</tr>
<tr>
<td>Human resources' soft capabilities</td>
<td>Soft capabilities are considered the way through which human resources can combine technical and specialized knowledge from different domains in order to support the definition of multidimensional perspectives. This variable aims at quantifying the possible contribution of human resources to support a company in better understanding the multidimensionality of social and economic dynamics.</td>
<td></td>
<td>MacGregor (1960), Yeung and Berman (1997), Kazlauskaitė and Bučiūnienė (2008)</td>
</tr>
</tbody>
</table>
p = 0.602), H2 (β = 0.675, p = 0.721) and H4 (β = 0.712, p < 0.001) were supported, whereas H3 (β = 0.497, p < 0.001) was not supported.

Finally, the model fit was verified measuring fitness indices such as goodness-of-fit index, normed fit index, confirmatory fit index, standard root mean square residual and root mean square error of approximation. As reported in Table VI, all the fitness indices met the cut-off values provided by the literature.

Discussion
Based on the results, it is possible to state that there is a positive relationship between human resources’ multidisciplinary study background and companies’ ROS (H1).

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>There is a positive relationship between multidisciplinary human resources’ study background and companies’ return on sales</td>
</tr>
<tr>
<td>H2</td>
<td>There is a positive relationship between previous work experience and companies’ return on sales</td>
</tr>
<tr>
<td>H3</td>
<td>There is a positive relationship between human resources’ work flexibility and companies’ return on sales</td>
</tr>
<tr>
<td>H4</td>
<td>There is a positive relationship between human resources’ soft capabilities and companies’ return on sales</td>
</tr>
</tbody>
</table>

Table III. Hypotheses under study

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Cronbach’s α</th>
<th>AVEs</th>
<th>Multidisciplinary human resources’ study background</th>
<th>Human resources’ previous work experience</th>
<th>Human resources’ work flexibility</th>
<th>Human resources’ soft capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multidisciplinary human resources’ study background</td>
<td>0.73</td>
<td>0.63</td>
<td>0.69</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Human resources’ previous work experience</td>
<td>0.81</td>
<td>0.71</td>
<td>0.51**</td>
<td>0.58</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Human resources’ work flexibility</td>
<td>0.74</td>
<td>0.68</td>
<td>0.60**</td>
<td>0.29**</td>
<td>0.87</td>
<td>–</td>
</tr>
<tr>
<td>Human resources’ soft capabilities</td>
<td>0.79</td>
<td>0.80</td>
<td>0.38**</td>
<td>0.17**</td>
<td>0.19**</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Notes: On the diagonals are reported the square roots of the AVEs. **Correlation is significant at the 0.01 level (two-tailed)
This result is in line with previous evidence provided by studies on the effect of education and training on human resources’ performance (Alvesson and Sveningsson, 2015; Paillé et al., 2014; Saviano, Barile, Spohrer and Caputo, 2017). From a general point of view, this result underlines the relevance for companies of building workforces endowed with multidisciplinary knowledge as a way to better understand and manage market dynamics (Paauwe and Boselie, 2003). Schuler and Jackson (1987) also clearly identified human resources’ education as a key driver for companies interested in creating competitive strategies, while Marr et al. (2004) focused on the several advantages that human resources endowed with multidisciplinary knowledge can provide to their companies in terms of better understanding ongoing economic dynamics. Reflecting on this result, it emerges that companies the need to invest in the selection and training of human resources to build ambidextrous workforces able to combine multiple perspectives and to define a holistic view of the market (Lepak and Snell, 1999).

The research also revealed that there is a positive relationship between human resources’ previous work experience and companies’ ROS (H2). This result is strongly aligned with previous research under the conceptual umbrella of HRM (Hughes and Weisbrod, 2016; Lussier and Hendon, 2017; Snell et al., 2015; Wilton, 2016). As clarified by Russell et al. (2016), previous work experience provides human resources with information, schemes and approaches useful for understanding environmental dynamics. Similarly, Cox and Blake (1991) stated that work experience represents the way in which human resources can develop a high sensitivity to market changes. Given this result, the need clearly emerges to investigate how previous work experience affects human resources’ ability and to analyze which kinds of work experience are useful in building ambidextrous workforces.

The research also demonstrated that there is not a positive relationship between human resources’ work flexibility and companies’ ROS (H3). This result calls attention to the debated topic of flexibility in MRM practices (Noe et al., 2006). Specifically, as underlined by MacDuffie (1995), the flexibility of human resources is a variable difficult to manage and measure, because it is affected by several external dynamics and because it does not follow a

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Standardized regression coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 (+)</td>
<td>Multidisciplinary human resources’ study background → companies’ ROS</td>
<td>0.680</td>
</tr>
<tr>
<td>H2 (+)</td>
<td>Human resources’ previous work experience → companies’ ROS</td>
<td>0.675</td>
</tr>
<tr>
<td>H3 (+)</td>
<td>Human resources’ work flexibility → companies’ ROS</td>
<td>0.497</td>
</tr>
<tr>
<td>H4 (+)</td>
<td>Human resources’ soft capabilities → companies’ ROS</td>
<td>0.712</td>
</tr>
</tbody>
</table>

**Note:** ***Standardized regression coefficient is significant at the 0.001 level (two-tailed)**

<table>
<thead>
<tr>
<th>Fitness indices</th>
<th>Value</th>
<th>Cut-off values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodness-of-fit index (GFI)</td>
<td>0.907</td>
<td>&gt; 0.90 (Jöreskog and Sörbom, 1996)</td>
</tr>
<tr>
<td>Normed fit index (NFI)</td>
<td>0.923</td>
<td>&gt; 0.90 (Hu and Bentler, 1999)</td>
</tr>
<tr>
<td>Confirmatory fit index (CFI)</td>
<td>0.971</td>
<td>&gt; 0.90 (Hooper et al., 2008)</td>
</tr>
<tr>
<td>Standard root mean square residual (SRMSR)</td>
<td>0.067</td>
<td>&lt; 0.06 (Hooper et al., 2008)</td>
</tr>
<tr>
<td>Root mean square error of approximation (RMSEA)</td>
<td>0.091</td>
<td>&lt; 0.08 (Hooper et al., 2008)</td>
</tr>
</tbody>
</table>

**Table V.** Hypothesis test via SEM

**Table VI.** Fitness indices
predictable evolution. In this vein, the results of this research represent a call both for practitioners and researchers to define instruments, models and techniques for measuring work flexibility and to understand its general evolutionary path.

Finally, the research demonstrated that there is a positive relationship between human resources’ soft capabilities and companies’ ROS (H4). This result is also in line with several recent contributions in the HRM field (Hsu and Wang, 2012). As demonstrated by Hansen (2001), soft capabilities allow human resources to build a bridge between the company and the market. More specifically, by utilizing soft capabilities, human resources can effectively provide feedback and useful information about the validity of companies’ strategies and market approaches in the light of a holistic view of the market (Collins and Smith, 2006; Evangelista et al., 2016; Teece and Pisano, 1994). The need emerges, therefore, to rethink traditional approaches to human-resource training and education with the aim of widening the focus from a strictly problem-solving view to a view that includes decision-making dynamics and variables (Barile et al., 2012).

Conclusions, limitations, implications and future directions for research
As underlined by multiple researchers through several empirical studies and theoretical contributions, market dynamics are becoming ever more turbulent, and their trends cannot be perceived or forecast using traditional managerial models (Caputo, 2016; Polese et al., 2016; Saviano et al., 2016). As a consequence of this challenging evolution, companies need to have human resources able to support innovative approaches to the market if they want to survive (Fernández et al., 2003; Hsu, 2007). Accordingly, human resources and HRM are progressively becoming relevant topics among researchers and practitioners interested in business management (Aswathappa, 2005; Price, 2007).

Recognizing the relevance of these topics, this paper has focused on the possible relevant contributions that human resources can provide in supporting companies facing emerging market turbulence. The concept of ambidextrous workforces has been formulated as a way of supporting companies facing emerging market turbulence; four variables have been identified as possible pillars of ambidextrous workforces and their relationships with companies’ economic performance have been tested using SEM.

Building upon previous managerial contributions and using an empirical study with a sample of 1,227 employees from 37 Italian SMEs, this paper has underlined the relevance of human resources’ multidisciplinary study background, human resources’ previous work experience, and human resources’ soft capabilities in affecting companies’ economic performance. Considering the above-mentioned variables as pillars of ambidextrous workforces, the paper also provides evidence that companies need to rethink their approaches to the selection, education and training of human resources.

However, this research cannot be considering exhaustive because it focuses only on four possible pillars for ambidextrous workforces. Accordingly, future research should aim to identify other possible dimensions within the concept of ambidextrous workforces and could possibly analyze their influences on companies’ performance, combining qualitative and quantitative research approaches in different cultural areas with the aim of creating a generalizable model.

Nonetheless, this paper enriches previous contributions to HRM, clarifying the need for shifting from a reductionistic view of human resources, as elements able to contribute to companies’ strategies and actions in respect to defined boundaries and roles, to a holistic view, in which human-resource knowledge, capabilities and experiences are considered key elements for companies interested in developing and adopting strategies aligned to the challenging market evolution. Moreover, the paper provides evidence regarding the advantages of considering (ambidextrous) employees not simply as resources, but as a source of value for companies through they can better understand and manage social and economic trends.
More specifically, this paper provides several interesting insights, both for researchers and practitioners, within the domain of HRM. First, the research emphasizes that the multidimensionality of human resources’ knowledge positively affects companies’ economic performance, highlighting the need to develop instruments that support managers in selecting and training ambidextrous human resources to better perceive social and economic dynamics through a multiple-perspectives approach. From a theoretical point of view, the research underlines the need for building both qualitative and quantitative approaches able to clearly define the multidimensionality of human resources’ knowledge, their dimensions, and the levers that act to increase their contributions to the achievement of companies’ purposes.

In addition, this work points out that there is a positive relationship between the heterogeneity of human resources’ previous experience and companies’ ROS. From this result, the need emerges for practitioners to develop instruments to evaluate previous human resources’ work experiences in more detail and develop approaches that explain how previous work experiences influence human resources’ contributions to the achievement of companies’ purposes. Finally, empirical evidence regarding the positive relationship between human resources’ soft capabilities and companies’ ROS underlines the need for rethinking consolidated education and training approaches in order to increase human resources’ ability to combine multiple perspectives in their daily actions and decisions. On this point, the research underlines the need for stimulating inter- and multi-disciplinary collaborations among human resources as a way to support the emergence of shared soft capabilities.

Ultimately, this research represents a call for rethinking both theoretical and practical approaches in HRM. Conceptual frameworks and empirical evidence should both be considered as a first step in the process to define the proposed concept of ambidextrous workforces. While this is not a new domain, there remains ample scope for systematizing previous contributions with the aim of understanding the role of human resources in ensuring companies’ survival by increasing the alignment between companies’ strategies and market changes.

References


**Further reading**


**Corresponding author**

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