Can you grow your supply chain without skills? The role of human resource management for better supply chain management in Latin America

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Abstract

Purpose – In line with the knowledge-based view of organizations, this paper aims to analyze how supply chain (SC) employees contribute to the creation of competitive advantage through knowledge acquisition and utilization activities. The authors consider SC employees' skills and competencies, their external network of relationships, their job satisfaction and company investments in training and test how they relate to SC-level outcomes (i.e. SC growth).

Design/methodology/approach – The authors design a research model including the aforementioned variables, and the authors apply structural equation modeling (SEM) to survey data collected from 246 SC professionals in Latin America. The authors also use multi-group analysis to evaluate how the relationships between these variables change with different levels of company investment in training.

Findings – The results show that a broad professional network of relationships contributes to increasing the skills and competencies of SC professionals, which, in turn, impact job satisfaction and SC performance. This reinforces the value of investing in skilled human talent, who can contribute to knowledge acquisition, utilization, and, ultimately, to SC competitiveness. Companies that invest more in training to develop their SC employees benefit from stronger SC outcomes.

Originality/value – This study contributes to broadening the understanding of the impact of human resource management (HRM) on supply chain management (SCM). One of the added original foci of this research is the

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emphasis on developing countries where these HRM-to-SCM performance relationships have not been studied before.

Keywords Knowledge-based view, Supply chain management, Skills, Latin America, Survey
Paper type Research paper

1. Introduction

Supply chain management (SCM) impacts directly the competitiveness of companies, economic sectors and countries (D'Aleo and Sergi, 2017). The global economy is increasingly structured around global supply chains (SCs) that link firms, workers, governments and consumers worldwide through complex supply, production and distribution networks across different countries (Mentzer *et al.*, 2001). SCs place a high demand on firms and their workforce to continuously reduce costs, improve quality and delivery, and increase productivity (Leon and Uddin, 2016; Bergstrom *et al.*, 2020). In addition, companies are required to reduce emissions, avoid social injustice and build in resilience, all of which are SC issues. In this challenging context, a prerequisite for the SCM success is the people in the organizations, also called the "soft side" of organizations (Dubey and Gunasekaran, 2015a, b).

A study by Deloitte shows that 90% of the most effective corporate leaders appoint an SC expert to lead the SCM function and hire the most technically competent people. Then, they invest in training them in leadership and advanced SC competencies (Marchese and Dollar, 2015). In a more recent study, Bergstrom *et al.* (2020) further highlight the importance of recruiting, empowering and retaining human talent to boost the performance and agility of organizations. Several studies conclude that the effectiveness of human talent positively affects firms' and SC productivity and competitiveness (Kilubi and Rogers, 2018; Gammelgaard and Larson, 2001; Fawcett and Waller, 2013; Barnes and Liao, 2012; Flöthmann *et al.*, 2018b; De Camargo Fiorini *et al.*, 2021).

Thus, proper human resource management (HRM) is critical to enhancing employees' ability to acquire and utilize knowledge, and contribute to the organization's goals (Kianto *et al.*, 2016). This perspective is in line with the knowledge-based view (KBV) of organizations (Grant, 1996; Crook *et al.*, 2011), which establishes a strong interconnection between SCM and HRM.

HRM involves a range of human resource policies, including recruitment, selection and talent management (Krishnan and Scullion, 2017). So far, the SCM literature has primarily focused on *what* competences and skills are needed for successful SCM (Shub and Stonebraker, 2009; Flöthmann and Hoberg, 2017), rather than exploring *how* human resources and HRM practices contribute to SC at different levels.

The KBV theory of organizations has emphasized that certain human resource aspects may contribute to organizational competitiveness. These aspects include the need for companies to encourage employees to develop a deep network of relationships (Sohal, 2013); to cultivate job skills through training (Derwick and Hellström, 2017; Flöthmann *et al.*, 2018b); and to keep the level of job satisfaction of their talent up (Nyberg, 2010). The role played by these factors is relatively unexplored in the SCM literature (Swart *et al.*, 2012; Lengnick-Hall *et al.*, 2013; Gómez-Cedeño *et al.*, 2015). The existing literature is focused on the characteristics of SC relationships – rather than those of internal SC employees – to explain companies' success.

This study focuses on specific human resource constructs (including the professional networking of the individuals, the level of job competencies and the level of investment in training) in order to analyze how they influence SC competitiveness. In particular, we aim to answer the following research question:

How do human resources and HRM contribute to long-term SC growth?

By answering this research question, we intend to establish a clear link between the individual-related nature of HRM and the industrial-related nature of SCM under the theoretical lens of the KBV – providing a contribution that is currently missing in both streams of the literature.

The paper is organized as follows. Section 1 introduced the subject; section 2 reviews the theoretical background by focusing on the relationship between KBV, HRM and SCM. Section 3 presents the research model and the main hypotheses. Section 4 describes the methodology, questionnaire design and data collection. Section 5 presents the statistical analysis. Finally, section 6 discusses the results, while section 7 concludes with the main theoretical and managerial contributions as well as opportunities for future research developments.

2. Theoretical background

SCM is a systemic, strategic coordination of business functions within and across organizations for improving the long-term performance of the individual companies and the SC as a whole (Mentzer *et al.*, 2001). This implies that the range of skills to support these activities cannot be found in a single person (Essex *et al.*, 2016). As mentioned before, SCM depends on human talent and knowledge-based systems to build long-lasting competitive advantages and high business efficiency (Huo *et al.*, 2015, 2016). Therefore, there is a constant need to find and raise the "right" talent to build differentiators for top-ranked organizations (Shub and Stonebraker, 2009). That need transformed how companies recruit, select, train and retain superior SC professionals (Swart *et al.*, 2012).

This section reviews the literature regarding the KBV perspective in SCM, which represents the theoretical foundation of our work.

2.1 The KBV in SCM

The KBV of the firm (Grant, 1996) represents an evolution of the resource-based view (RBV: Barney *et al.*, 2001) It conceptualizes organizations as "knowledge-based" systems. According to this perspective, knowledge represents the most important asset for companies as a fundamental driver for creating and sustaining competitive advantage (Zacharia *et al.*, 2011; Schoenherr *et al.*, 2014; Wang *et al.*, 2021).

Successful knowledge exploitation in modern SC depends on the interaction with actors outside the organization, including suppliers, governments, research institutions, intermediaries and customers, all of which are sources of external knowledge generation (Handfield *et al.*, 2015). In this sense, previous literature has differentiated the phases of *knowledge acquisition* from *knowledge utilization* when discussing how organizations can manage external knowledge in order to obtain superior organization performance (Wang *et al.*, 2021).

The previous SCM literature has focused on how knowledge management takes place in the context of business-to-business (B2B) relationships (Möller and Halinen, 1999; Sohal, 2013; Sangari *et al.*, 2015; Riley *et al.*, 2016). It looked at the processes required in order to reinforce effective knowledge management (Jin *et al.*, 2010; Schoenherr *et al.*, 2014; Wu *et al.*, 2014).

Very few studies, however, centered on the role that employees play in SCM knowledge management (Swart *et al.*, 2012; Dubey and Gunasekaran, 2015a; Huo *et al.*, 2015, 2016; Flöthmann *et al.*, 2018b). Other than the nature of the industrial relationships with external partners, effective knowledge acquisition and utilization strictly depends on the quality of the human resources of the organizations (Crook *et al.*, 2011; Chowhan, 2016). Thanks to competent, skilled and motivated human talent, organizations can acquire external knowledge and then, utilize it to obtain superior performance (Barnes and Liao, 2012).

Thus, companies need both to establish appropriate relationships and knowledge management mechanisms with external partners (Hult *et al.*, 2007; Crook *et al.*, 2011; Wu *et al.*, 2014); and to invest in hiring and developing appropriate knowledge resources. The success and sustainability of knowledge acquisition and utilization ultimately depend on the structure of the external relations and the quality of the human talent operating in SCs (Shub and Stonebraker, 2009; Essex *et al.*, 2016; Kumar and Paraskevas, 2018).

In summary, the design of an ideal SC ecosystem is a necessary but not a sufficient condition to exploit external knowledge (De Camargo Fiorini *et al.*, 2021). Companies must also invest in creating an internal environment that attracts superior SC professionals and enhance the development of their capabilities. Given this critical role of human resources, it is important to understand the impact that HRM-specific practices on the development of internal SC resources.

2.2 HRM in SCM

SC professionals operate in complex and dynamic environments, which call for heterogeneous skills and competences (Derwik and Hellström, 2017; Shou and Wang, 2017; Flöthmann *et al.*, 2018a). Thus, organizations require structured and sound HRM practices (Noe *et al.*, 2017) with the objective to attract, develop, motivate and retain high-quality human capital (Myers *et al.*, 2004; Murphy and Poist, 2007; Menon, 2012; Kiessling *et al.*, 2014; Flöthmann *et al.*, 2018b).

Given the dearth of SC professionals who possess the full range of technical competencies and managerial skills (Dubey and Gunasekaran, 2015a; Jordan and Bak, 2016; Leon and Uddin, 2016), most studies have focused on what the "ideal" profile of SC professionals should be (Gammelgaard and Larson, 2001; Rossetti and Dooley, 2010; Derwik and Hellström, 2017; Flöthmann and Hoberg, 2017; Flöthmann *et al.*, 2018a). Other studies explored how HRM can lead to better coordination of the SC actors (Lengnick-Hall *et al.*, 2013; Kiessling *et al.*, 2014; Hohenstein *et al.*, 2014; Essex *et al.*, 2016; Huo *et al.*, 2016; Riley *et al.*, 2016). The latter focused on specific HRM aspects such as performance management, teamwork, motivation and retention of SC employees (Menon, 2012; Leon and Uddin, 2016; Prockl *et al.*, 2017).

Only a small portion of these studies try to explore *what* HRM practices contribute to skills and capability building in SC (Gowen and Tallon, 2003; Sohal, 2013; Ellinger and Ellinger, 2014) and/or *how* they impact personal and organizational performance (Jin *et al.*, 2010; Antoncic and Antoncic, 2011; Crook *et al.*, 2011; Swart *et al.*, 2012; Sohal, 2013; Dubey and Gunasekaran, 2015b; Gómez-Cedeño *et al.*, 2015; Flöthmann *et al.*, 2018b).

This provides further impetus to connect HRM and SCM through the lens of the KBV. By studying the processes of knowledge acquisition at the individual level, and how HRM practices contribute to the competence building of SC professionals, one can, possibly, better understand the impact of these aspects on SC competitiveness and performance.

3. HRM practices and supply chain performance: a missing link

To explore how individual-level features of HRM contribute to SC performance, this study considers five relevant factors – in line with the KBV – combined into the research model.

3.1 Professional network of relationships

At the company level, knowledge acquisition happens through the interaction with external SC stakeholders (Wang *et al.*, 2021). At this level, knowledge exchange can take place through personal networks of the employees (also called "social capital"; Flap and Boxman, 2017). These relationships represent their networking power and relationship with the external world (Baron and Markman, 2000; Holtom *et al.*, 2006; Ford and Mouzas, 2013). This

individual asset can be measured as the extent to which individuals have established connections with influential people and/or organizations (Baron and Markman, 2000; Barnes and Liao, 2012; Sohal, 2013). Such professional networking can enhance communication, motivate the discussion of ideas and ultimately contribute to knowledge sharing and co-creation (Gomez and Sanchez, 2005; Wood *et al.*, 2016; Schermuly and Meyer, 2016). A stronger relationship network facilitates access to broader and better sources of knowledge, thus helping the individual growth and the improvement of specific skills (Seibert *et al.*, 2001; Payne, 2005; Holtom *et al.*, 2006; Ford and Mouzas, 2013; Wu *et al.*, 2014).

3.2 Job skills and competences

Individual skills and competences are core for successful organizations (Gammelgaard and Larson, 2001; Crook *et al.*, 2011). Flöthmann *et al.* 's (2018a) study of the key competencies of SCM personnel is a benchmark of the development of job skills and competences in SCM. In particular, their frameworks suggest that competences of SC professionals include: (1) technical expertise, (2) management skills, (3) interpersonal skills and (4) analytical and problem-solving abilities. It is due to their skills that SC professionals can "put into action" externally acquired knowledge and improve organizational performance (Murphy and Poist, 2007; Kiessling *et al.*, 2014; Essex *et al.*, 2016; Jordan and Bak, 2016; Derwik and Hellström, 2017; Flöthmann *et al.*, 2018b).

3.3 Investment in training initiatives

The ability of SC human talent to acquire and utilize knowledge depends on individual characteristics and it may be improved by corporate decisions. In this sense, designing and developing successful HR practices (Lai Wan, 2007; Kuvaas and Dysvik, 2009, 2010) can help build valuable SC employees, who are critical for effective knowledge management (Barney, 2012; Barnes and Liao, 2012).

Several HRM studies have explored the role of training programs in improving employees' competences, skills and ability to interact with external actors (Sung and Choi, 2014; Memon *et al.*, 2016). Training and development are pertinent to engross collective knowledge, build competencies and reinforce or expand professional networks (Elnaga and Imran, 2013; Sohal, 2013; Rivera *et al.*, 2016). This is particularly true for SC jobs, characterized by a mix of technical and managerial competencies and evolving interactions (Murphy and Poist, 2007; Derwick and Hellström, 2017).

In this sense, previous literature already supports the idea that investments in training initiatives can help to increase the employee's contribution to the organizational (and SC) effectiveness (Osterman, 2006; Fisher *et al.*, 2010; Al Ariss and Sidani, 2016; Flöthmann *et al.*, 2018b; Jung and Takeuchi, 2019).

3.4 Supply chain job satisfaction

Job satisfaction describes the emotional state that employees are in with regard to their work activities, environment and conditions (Nyberg, 2010). Superior organizational performance is mostly attained when the employee enjoys her work and perceives a proper remuneration and benefits in exchange for it (Kehoe and Wright, 2013; Flöthmann and Hoberg, 2017).

The factors contributing to job satisfaction include economic aspects such as pay growth, promotion rate, rewards (Osterman, 2006; Seibert *et al.*, 2001; Prockl *et al.*, 2017) as well as non-economic and motivational aspects such as the working environment and work-life balance (Humphrey *et al.*, 2007). Together these factors contribute to wellbeing and high performance. Furthermore, several studies highlight how employees will more effectively acquire, create, utilize and selflessly transfer knowledge – thereby contributing to organizational (and SC)

success – when they are satisfied with their work status (Antoncic and Antoncic, 2011; Keohe and Wright, 2013; Ellinger and Ellinger, 2014; Kianto *et al.*, 2016).

3.5 Supply chain growth

In line with the KBV theory, the main purpose of growing and developing employees is to acquire new knowledge and/or customize it to support organizational competitiveness (Hult *et al.*, 2007; Chowhan, 2016). In SCM, human talent and its features have been recognized as key factors in helping SCs perform (Shub and Stonebacker, 2009; Ellinger and Ellinger, 2014; Tung, 2016). To justify investments in SC capabilities improvements, one needs to evaluate the contribution of to SCM, in terms of (1) better execution of activities (Lengnick-Hall *et al.*, 2013; Sangari *et al.*, 2015) and introduction of innovative practices (Gowen and Tallon, 2003; Huo *et al.*, 2015); and (2) growth of the SC over time (in terms of size and geographical presence; Baron and Markman, 2000; Ford and Mouzas, 2013; Wu *et al.*, 2014; Dubey and Gunasekaran, 2015a; Huo *et al.*, 2016; De Camargo *et al.*, 2021).

3.6 The role of human talent in SCM: a conceptual model

While several previous studies try to address some of the factors mentioned above (Awan and Sarfraz, 2013; Ellinger and Ellinger, 2014; Derwik and Hellström, 2017; Kilubi and Rogers, 2018), we offer an integrated view and interpretation of their relationship using KBV theory.

We offer a bridge between HRM and SCM by analyzing these constructs and their relationships using the theoretical model illustrated in Figure 1.

The model assumes that in order to create new knowledge, SC employees need to possess an appropriate level of skills and competencies. These skills can be upgraded through the interactions within the employees' professional network and, in some cases, knowledge creation. These factors are expected to improve the individual's job satisfaction and contribute to the growth of the SC through improved performance. Furthermore, they can be

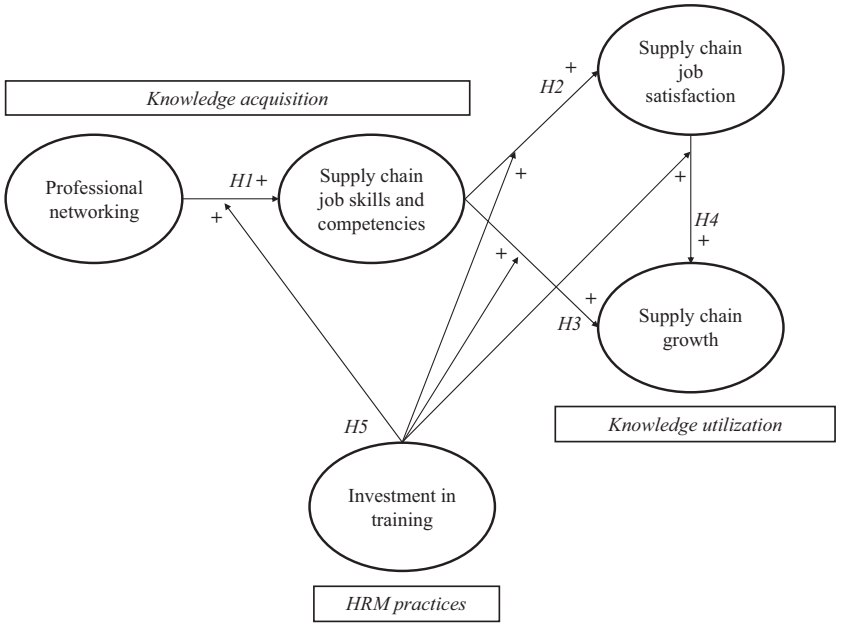

Figure 1.
Research model

influenced by HRM practices, in particular investment in developing individual skills via multiple training programs. The model is based on five hypotheses, which are described in the following subsection.

3.7 Hypothesis development

The KBV theory suggests that knowledge acquisition may be based on an extensive network of relationships (Schoenherr *et al.*, 2014), which leads to improved individual skills and consequent knowledge growth (Möller and Halinen, 1999; Baron and Markman, 2000). This is even more important in SCM, where the complexity of the SC activities amplifies the need for professional networking (Huggins *et al.*, 2012). Thus, SC employees interact with several external SC stakeholders and individual actors at diverse levels (Ford and Mouzas, 2013; Wright and Kaine, 2015).

These professional relationships with people who hold relevant roles and/or qualifications for the employee's context are most valuable in encouraging knowledge acquisition and fostering individual skills development (Barnes and Liao, 2012; Schermuly and Meyer, 2016). Thus:

H1. Strong professional networking of SCM employees (i.e. external business relationships) is associated with a high level of job skills and competencies.

By developing skilled workers and investing in human resources, organizations may get improvements at individual, organizational and SC levels. A broad set of HRM scholars already argue that companies may increase employees' job satisfaction when they support the development of their competencies (Payne, 2005; Kehoe and Wright, 2013).

For the specific case of SC-related jobs, professionals are required to grow a multi-faceted set of skills. SC jobs allow employees to express their competencies and use their knowledge to improve their own abilities (Fawcett and Waller, 2013). Companies reward workers for the complex tasks they face by providing them benefits in terms of salary and non-economic privileges (Lai Wan, 2007; Humphrey *et al.*, 2007). High satisfaction can increase the company's ability to retain the best performers, to preserve knowledge and continue creating and transferring knowledge to create competitive advantage (Myers *et al.*, 2004; Kianto *et al.*, 2016). Thus:

H2. High level of job skills and competencies of SCM employees is associated with a high level of job satisfaction.

Having high-skilled employees is a prerequisite to generating and applying new knowledge. KBV theory links this to organizational growth and efficiency (Huo *et al.*, 2015, 2016, De Camargo Fiorini *et al.*, 2021). There is strong evidence that improving job skills increases productivity and firm's performance (Crook *et al.*, 2011). Specifically, the SCM literature supports the notion that strong skills of SC employees enable globalization and the resulting expanded SC (Fisher *et al.*, 2010; Menon, 2012; Wu *et al.*, 2014; Huo *et al.*, 2016; Flöthman *et al.*, 2018a, b). Thus, skilled and competent employees can use their knowledge to enable not only operationally, through SC improvements, but also strategically, by expanding markets and deploying effective distribution networks (Hohenstein *et al.*, 2014; Jordan and Bak, 2016). Thus:

H3. A high level of SCM job skills and competencies is associated with a high supply chain growth.

Employees' satisfaction is also a crucial component of knowledge creation and utilization, as it builds trust, empathy and helps to execute tasks efficiently (Von Krogh, 1998; Nyberg, 2010; Kianto *et al.*, 2016). Previous works support the notion that employees' satisfaction with their

job contributes not only to their individual performance but also to organizational growth (Osterman, 2006; Awan and Sarfraz, 2013; Dubey and Gunasekaran, 2015b). For our purposes, it is relevant to capture any causality between employees' satisfaction and their role in the knowledge utilization process. In other words, whether (or not) job satisfaction mediates the effect of job skills on organizational performance. Thus:

H4. The level of SCM job satisfaction mediates the relationship between job competencies and supply chain growth.

Training and development programs are required in order to recruit, retain and develop talented SCM professionals. The objective is to ensure that employees are equipped with the right skills and competencies to acquire, exchange and utilize knowledge, (Elnaga and Imran, 2013; Sung and Choi, 2014; Noe *et al.*, 2017; Flöthmann *et al.*, 2018b). Training initiatives are varied and range from participation in knowledge-specific courses (managerial and/or technical) to long-term post-graduate programs (like MBA or specialized Masters).

The previous HRM literature analyzed the mechanisms through which training can impact employee's attitudes and behaviors (Kuvaas and Dysvik, 2009, 2010; Koster *et al.*, 2011; Jung and Takeuchi, 2019), suggesting that training causes employees to feel a greater sense of obligation toward their organization. This, in turn, drives enhanced employee's attitudes which, in prior studies, has been demonstrated to be positively linked to higher job satisfaction (Koster *et al.*, 2011), commitment to the organization (Kuvaas and Dysvik, 2010), loyalty (Koster *et al.*, 2011) and ability to interact with peers (Kuvaas and Dysvik, 2009).

The process through which employees respond to their organizational investments in their development is unclear (Jung and Takeuchi, 2019). It is particularly interesting to test this role in the turbulent context of SC professionals, assuming that different levels of investment have a positive impact on the knowledge acquisition and utilization processes. Thus:

H5. High level of investments in training for SC employees results in positive relationship between:

(a) Professional networking and job skills and competencies

(b) Job competencies and job satisfaction

(c) Job competencies and SC growth and

(d) Job satisfaction and SC growth

4. Methodology

A survey was used to collect the data for model estimation. The data were collected through a questionnaire asking about HRM practices, employee characteristics and SC attributes. Its elements are described below.

4.1 Questionnaire design and definition of constructs

We followed the standard procedure for survey design and scale development (Hensley, 1999).

Prior to data collection, a structured review of the literature across the HRM and SCM fields helped us analyze how previous scholars measured the constructs included in our model and whether we should adapt them. This preliminary scale development led us to a survey instrument including 30 questions across the five constructs of the model, using a seven-point Likert scale.

The scales were purified by piloting this 30-item preliminary version of the survey on a small sample of respondents. This pre-test allowed us to collect both qualitative feedback (through comments from respondents) and quantitative evidence (through exploratory factor analysis) about the validity of the scales. This process allowed us to introduce some improvements such as eliminating a few items used to measure some of the constructs; modifying the formulation of existing items; introducing a five-point Likert scale; and cleaning the survey.

The final version of the questionnaire included 21 questions pertaining to the four areas included in the model (i.e. professional networking of SC employees; types of job skills and competencies; job satisfaction; SC growth; investment in training). In addition, we collected socioeconomic data, years of employee experience and company characteristics from the surveyed professionals. The detailed items included in each construct, together with the main literature sources and measurement indicators, are given in Table A1.

Following the definition of *professional networking* proposed by Flap and Boxman (2017), we asked the respondents to rate, on a Likert scale from 1 ("no relationships") to 5 ("with more than 15 people"), the extent of their relationships with other business professionals.

In line with previous studies (Derwik and Hellström, 2017; Shou and Wang, 2017; Flöthmann *et al.*, 2018a, b), SC *job competencies* aims to conceptualize the soft and hard competencies of SC employees, usually required for their positions. We used a Likert scale from 1 ("not at all") to 5 ("to a large extent"), to measure the extent to which they considered their goal orientation and problem-solving, possessing quantitative skills and having competence in project and resource management.

Investment in training represents the company's effort and allocated budget to provide employees with further education and learning opportunities (in line with Rivera *et al.*, 2016; Riley *et al.*, 2016). A Likert scale from 1 ("not at all") to 5 ("to a large extent") was used to measure the company's investments in developing skills, including training in undergraduate, post-graduate and executive education programs.

Following the definition provided by Nyberg (2010) and Judge *et al.* (2017), SC *job satisfaction* represents the level of Job satisfaction. Respondents were asked to rate on a Likert scale from 1 ("not at all") to 5 ("to a large extent"), their level of satisfaction with their work setting, benefits and the job's impact on personal life.

Finally, for SC *growth,* in contrast with existing studies mostly focused on operational aspects, we intended to capture the contribution of the employees to the growth of their company (Wu *et al.*, 2014; Kilubi and Rogers, 2018), in line with the KBV theory. A Likert scale from 1 ("0% or negative") to 5 ("more than 15%") measured the extent to which the company was able to increase the number of (1) employees; (2) products offered on the market; (3) and suppliers, in the last 10 years. These proxies of growth show that the company is expanding its size, product lines and using more vendors to supply raw materials, services, or components for the company.

In addition to the primary constructs in the model, several dummy variables were used as controls for *growth,* including industry (i.e. manufacturing, service, retailing); company size (operationalized through dummy variables reflecting the EU classification of small vs. large firms); geographical scope (using two dummy variables for national vs. multinational companies); percentage of employees benefiting from training (using three dummy variables for 0–20% vs. 21–60% vs. 61–100%). Details about the validity, reliability and consistency of these final measures are given in Table 2.

4.2 Data collection and sample characteristics

The lack of HRM research in developing countries has been documented before (Tung, 2016). A large fraction of workers in these countries perform manual labor. Also, the most advanced

educational innovation schemes (e.g. experiential learning and competency-based learning) are not available to most people in regions such as Latin America and the Caribbean (Al Ariss and Sidani, 2016). The result is a gap in the development of managerial skills such as communication and leadership.

Moreover, Latin America and the Caribbean face further multiple challenges, including ineffective logistics operations, income inequality, and social and political instability (Bonache *et al.*, 2012; Mejia-Argueta *et al.*, 2020). The presence of low-skilled workers makes their jobs low-paying and not technologically-enhanced; thus, making it difficult to offer training (Perez-Arrau *et al.*, 2012). Thus, Latin America can be a test bed as to whether HR practices can contribute to organizational competitiveness in contexts where the role of these variables is unclear.

We selected Colombia as our unit of analysis, an emerging economy with a large logistics sector, which accounts for 8.12% of the country's total labor force, with an annual growth rate of 1% (Bogotá 's Chamber of Commerce & United Nations Development Program, 2021). We distributed the survey at six events organized by LOGYCA, a Colombian organization that defines international standards and offers logistics products and services for over 650,000 different companies across Latin America. These events were held in four main cities in Colombia and attended by a total of 380 people between 2018 and 2019. The profile of attendees to these events was primarily SCM professionals in service, retail and manufacturing industries.

At each event, we delivered the survey to the registration table and asked attendees to fill out the survey during the event. Clear instructions were written in the printed version of the survey, and the research team answered questions about the survey (e.g. applicability and interpretation of survey questions to a specific industry) while it was administered. We collected data from 363 respondents. However, after removing responses with missing values on critical items, we obtained 246 useable responses, which correspond to a net response rate of 65%. Table 1 depicts the relevant descriptive statistics of the sample.

4.3 Statistical approaches for model testing

Because the objective of our research is theory-testing and confirmation, the presented hypotheses were tested using covariance-based structural equation modeling (CB-SEM) (Hair *et al.*, 2017). First, to check the reliability of the hypothesized constructs, a confirmatory factor analysis (CFA) was performed. Following indications by Byrne (2013), we also used average variance extracted (AVE), composite reliability (CR) and Cronbach's alpha (CA) to assess construct validity. Acceptable values of CR and CA are above 0.7, while the AVE should be higher than 50%. The model was tested using maximum likelihood (ML) (White, 1982). The ML estimation assumes that the variables in the model are conditionally multivariate normal, which was the case for our dataset according to the Doornik-Hansen and Henze–Zirkler tests.

To evaluate the effect of *investment in training* (Goldsby *et al.*, 2013), we explored differences between firms characterized by a "high" level of investment and firms characterized by "low" level of investment. A multi-group analysis of structural invariance across companies in the sample was conducted by estimating and comparing the joint constrained model (where the parameters across groups are constrained to be equal to each other) and the unconstrained model (where the coefficients are allowed to vary freely across groups) for the two groups.

As multi-group analysis requires the moderator to be a categorical variable, we needed to discriminate between companies with "high" and "low" *investment in training*. To do that, we considered the construct's mean value and separate the sample according to respondents positioned above (>3.11) or below (<3.11) this threshold. This split the sample into $N_{high} = 105$ and $N_{low} = 141$.

Descriptive	Freq	%	Descriptive	Freq	%
Size			*Respondent gender*		
>250	135	*54.9*	Male	121	*49.2*
100–250	23	*9.3*	Female	125	*50.8*
50–100	20	*8.1*	*Respondent position*		
<50	63	*25.6*	Country and international supply chain executive	46	*18.7*
Missing	5	*2.0*	Regional and local executive supply chain managers	52	*21.1*
Industry sector			Indoor supply chain coordinators	44	*17.9*
Logistic provider	32	*13*	Outdoor supply chain coordinators	41	*16.7*
Manufacturing	50	*20.5*	Logistics/Operations supervisor	49	*19.9*
Retailer	134	*54.5*	Logistics/Operations technician	14	*5.7*
Other service	30	*12*			
			Respondent experience		
Geographical scope			<5	28	*11.4*
National firm with national operations	111	*45.1*	5–10	35	*14.2*
National firm with Latin American operations	55	*22.4*	10–15	54	*22.0*
National firm with global operations	20	*8.1*	15–25	97	*39.4*
International firm with operations in the country	32	*13.0*	>25	32	*13.0*
Multinational firm with global operations	28	*11.4*			
Total	*246*	*100*		*246*	*100*

Table 1.
Descriptive statistics about collected sample

To evaluate the model fit, we use a combination of the chi-square goodness-of-fit statistic and other absolute and relative fit indices (Hu and Bentler, 1999). This includes the ratio between the chi-square value and the degrees of freedom in the model, the comparative fit index (CFI) and the root mean square error of approximation (RMSEA).

5. Data analysis and results

We estimated the measurements, factor analyses and structural models across groups. The main results of the statistical experiments are shown below.

5.1 Confirmatory factor analysis: constructs reliability, validity and consistency

Table 2 presents the results of the CFA. All the measurement model fit indicators were found to be satisfactory (χ^2/d.f. = 1.89; CFI = 0.955; TLI = 0.944; RMSEA = 0.048). In addition, convergent and discriminant validity of the constructs were assessed through significant loadings from all scale items on the hypothesized constructs as well as through the AVE, CR and CA. AVE ranged from 47.5% to 66.8%, and both CR and CA were higher than 0.7 for all the constructs.

For two constructs, SC *job skills* and *job satisfaction*, the AVE was near the *50%* criterion; for this reason, we further inspected if multicollinearity is a problem for our dataset by checking the variance inflation factor (VIF). VIF values ranged between 2 and 3 for all the items, demonstrating that multicollinearity was not an issue in our data.

As an additional test for discriminant validity, Table 3 depicts the squared correlation between two latent constructs to their AVE estimates (Fornell and Larcker, 1981). According

Construct	Factor loadings	Average variance extracted	Composite reliability	Cronbach alpha
Professional networking		65.8%	0.850	0.830
REL1	0.651			
REL2	0.899			
REL3	0.861			
Supply chain job skills and competencies		47.5%	0.783	0.752
SKILL1	0.675			
SKILL2	0.705			
SKILL3	0.723			
SKILL4	0.652			
Supply chain job satisfaction		50%	0.831	0.816
SAT1	0.699			
SAT2	0.778			
SAT3	0.602			
SAT4	0.637			
SAT5	0.798			
Investment in training		59.1%	0.877	0.876
TRAIN1	0.660			
TRAIN2	0.711			
TRAIN3	0.870			
TRAIN4	0.825			
TRAIN5	0.760			
Supply chain growth		51.5%	0.759	0.748
PERF1	0.593			
PERF2	0.781			
PERF3	0.764			

Table 2. Constructs reliability, validity and consistency

to this test, the square root of the AVE for each construct should be higher than the squared correlation between each pair of constructs. This condition was met for all the constructs; this further confirms the reliability of the hypothesized reflective constructs.

Finally, the common latent factor technique was applied as a way to address common method bias (Craighead *et al.*, 2011). We found that the common latent variable has a linear estimate of 0.512. This value indicates a variance of 0.262, which is below the threshold of 0.50. Thus, this suggests that common variance does not represent a problem in our study.

5.2 Structural model

On the full sample (i.e. without splitting it into high/low investments), the postulated path model produced a sufficient fit to the data (χ^2/d.f. = 1.69; RMSEA = 0.053; CFI = 0.949; TLI = 0.939; see Table 4). The structural model shows a highly positive and significant

	Mean	St. dev	1	2	3	4	5
1. Professional networking	3.10	1.05	*0.811*				
2. Supply chain job skills and competencies	3.7	0.71	0.263**	*0.664*			
3. Supply chain job satisfaction	4.07	0.96	0.137*	0.252**	*0.706*		
4. Investment in training	3.11	1.21	0.309**	0.232**	0.241**	*0.769*	
5. Supply chain growth	3.40	1.26	0.262**	0.124**	0.016	0.411***	*0.717*

Note(s): ***$p < 0.001$; **$p < 0.001$; *$p < 0.05$; $^{NS}p > 0.05$; value of *t*-statistics in bracket

Table 3. Correlation matrix (square root of the AVE on the diagonal, in italics)

Dependent variables	Supply chain job skills and competencies	Supply chain job satisfaction	Supply chain growth
Independent variables			
Professional networking	0.271*** (3.65)		
Supply chain job skills and competencies		0.252** (3.25)	0.158* (2.12)
Supply chain job satisfaction			-0.020^{NS} (-0.24)
Control variables			
Size: small			0.078^{NS} (1.71)
Size: big			-0.030^{NS} (-0.28)
Industry: retailer			0.111^{NS} (1.41)
Industry: manufacturing			0.071^{NS} (0.85)
Scope: national			0.105^{NS} (1.29)
Employees benefit of training: 0–20%			-0.064^{NS} (-0.857)
Employees benefit of training: 61–100%			0.195* (2.37)
R^2	*0.264*	*0.179*	*0.113*

Note(s): ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{NS}p > 0.05$; value of *t*-statistics in bracket

Table 4. Path analysis

relationship between *professional networking* and SC *job skills* ($\beta = 0.271$, $p < 0.001$) and between SC *job skills* and both SC *job satisfaction* ($\beta = 0.252$, $p < 0.01$) and SC *growth* ($\beta = 0.148$, $p < 0.05$). Thus, the model fails to reject H1, H2 and H3.

Our results do not support the hypothesized mediation of job satisfaction. Although SC *job skills* positively affect SC *job satisfaction*, the latter does not significantly affect SC *growth* ($\beta = -0.020$, $p > 0.05$); thus, H4 needs to be rejected.

In addition, results regarding control variables for *size*, *industry and geographical scope* were never significant, while they were for the *percentage of employees benefit from training*. There is a positive relationship between companies with a high percentage of employees taking advantage of training and SC growth, which provides further motivations for the multi-group analysis.

5.3 Multi-group analysis

Since the full group model may mask the specific effects of a company's investments in training and development, a multi-group model was examined to assess whether or not the factor loadings and path estimates of the measurement model are invariant across the "High" and "Low" clusters.

First, we constrained the structural paths in the model to be equal across groups, then we retained all equality constraints of factors and we compared the fit of the constrained model with the fit of the unconstrained model using the difference in chi-square statistic. If the chi-square difference statistic does not reveal a significant difference between the unconstrained and constrained models, it can be concluded that factor loadings and structural paths for the different groups are identical.

The constrained model fits the data sufficiently well (χ^2/df = 1.52, CFI = 0.913; TLI = 0.908; RMSEA = 0.056) and so does the unconstrained one (χ^2/df = 1.58, CFI = 0.901; TLI = 0.904; RMSEA = 0.064). The variations of the goodness-of-fit indicators (ΔCFI = 0.012), of degree of freedom (Δdf = 22) and χ^2 ($\Delta\chi^2 = 43.72$) are significant with *p*-value < 0.01 according to the likelihood-ratio (LR) test. Thus, we conclude that difference in

factor loadings and path estimates within the two groups is statistically significant, and so the model is characterized by non-invariant structural path.

As non-invariance exists, we can test for invariance of single path (structural) coefficient between the respondents working for companies with "high" or "low" investment in training. Our procedure compared the models where individual path coefficients were allowed to differ (one by one) between the cases of high and low investment in training, to the unconstrained model. The hypothesis regarding the invariance of particular path coefficients can then be tested using the score and LR tests (see Table 5).

The analysis shows that the two paths are significantly different across groups. The relationship between *SC job skills and competencies* and *SC job satisfaction* ($p < 0.05$) is stronger in the case of companies with low investment in training (H5b), while the relationship between *SC job skills and competencies* and *SC growth* ($p < 0.01$) is positive and significant only for the companies with high investment in training (H5c). For both groups, the relationship between *SC job satisfaction* and *SC growth* is still not significant and not significantly different ($p > 0.1$; H5d). No difference was found in the relationship between *professional networking* and *SC job skills and competencies* (H5a). This means that the moderating effects of the *investment in training* are only partially verified (and H5 only partially supported).

6. Discussion of results

The statistical analyses have several implications.

6.1 Knowledge acquisition at the individual level

Confirmation of H1 implies that in order to enhance their skills SCM professionals must build stronger external relationships through professional networking. Having a strong network of relationships allows SC professionals to create, through social interactions, a knowledge exchange process contributing to the individual's growth and development. This result is in line with previous SCM literature that highlights the role of external sources of knowledge within B2B relationships (Huggins *et al.*, 2012; Schoenherr *et al.*, 2014; Wang *et al.*, 2021), but also the HRM literature, that documented how professional networking at the individual level can contribute to knowledge co-creation (Gomez and Sanchez, 2005; Wood *et al.*, 2016; Schermuly and Meyer, 2016).

Individuals represent a source of competitive advantage for companies when the employees possess skills and competencies that allow them to use their knowledge

Table 5.
Multi – group SEM: path differences across groups

	High investment in training	Low investment in training	LR test
Supply chain job skills and competencies			
← *Professional networking*	0.215** (2.39)	0.302*** (3.24)	$p > 0.1$
Supply chain job satisfaction			
← *Supply chain job skills and competencies*	0.176* (2.02)	0.384*** (4.20)	$p < 0.05$
Supply chain growth			
← *Supply chain job skills and competencies*	0.211** (2.35)	0.068^{NS} (0.576)	$p < 0.01$
← *Supply chain job satisfaction*	0.087^{NS} (0.683)	-0.046^{NS} (−0.379)	$p > 0.1$

Note(s): ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{NS}p > 0.05$; value of *t*-statistics in bracket

(Kang *et al.*, 2007). These can be gained not only through self-development but also by accessing other professionals who already have these skills across the SC.

Our results show that companies should encourage the span of professional networking of their SC employees (which represents a new result for the SCM literature). In addition, SC employees should take advantage of this continuous interaction with experienced employees for improving their competencies.

External relationships give SC employees access to information and knowledge that would help them improve, but also put some "positive pressure" to develop themselves, thus initiating a virtuous cycle (Ford and Mouzas, 2013; Wright and Kaine, 2015).

6.2 Knowledge utilization, job satisfaction and supply chain competitiveness

The model's results also support the hypothesis that SC professionals who have high skills are also more satisfied with their jobs (H2). Higher skills help people access jobs that fit their expectations and increase their satisfaction. This result is not new in the general HRM literature (Payne, 2005; Kehoe and Wright, 2013; Judge *et al.*, 2017). By trading on their skills, SC professionals can find an appropriate work environment, benefit from economic and non-economic rewards and design a balanced work-life routine. A high level of employee motivation boosts their interest in using their knowledge to contribute to their company's growth. This is part of a positive feedback loop, increasing, in turn, their job satisfaction (Kianto *et al.*, 2016).

The positive relationship between the level of job skills and SC growth confirms our hypothesis, (H3). High competencies increase the ability of SC professionals to utilize and create new knowledge, which helps them improve their own and their organization's performance (Huo *et al.*, 2015, 2016; De Camargo *et al.*, 2021). This result confirms empirically the role that employees have in the SC's growth.

Our results suggest that the relationship between job competencies and SC growth does not depend on job satisfaction (H4), which is in contrast with existing studies (Osterman, 2006; Awan and Sarfraz, 2013). We surmise that individual professionalism is not impacted by job satisfaction. Our model suggests that individual competencies represent the only relevant driver for SC decisions. This result accentuates the importance of HR practices focused on the development of these skills.

6.3 HR practices for better supply chain human talent

Although our results only partially confirm the effect of investment in training (H5), they still demonstrate the critical role played by training and developing SC professionals (in line with Flöthmann *et al.*, 2018b). Our analyses suggest that the relationship between job skills and professional networking is significant in the cases of both high and low investments. This means that relationships with external stakeholders are a valuable source of knowledge acquisition for SC individuals regardless of the HRM practices used (Baron and Markman, 2000; Holtom *et al.*, 2006; Ford and Mouzas, 2013; Flap and Boxman, 2017). This relationship is more significant for low-investing companies. The reason is probably that when the company does not invest internally, highly engaged workers look at opportunities for personal growth outside the organization (Barnes and Liao, 2012; Lengnick-Hall *et al.*, 2013; Wright and Kaine, 2015).

This result is not found in the extant literature. Formal training and development programs provide value for employees, but they also require an extra time and effort from them. These activities may impact some aspects of the employee's satisfaction with her job (such as work-life balance).

Finally, our results demonstrate that skilled employees do contribute to SC growth when they are supported by investment in training and development schemes. In line with most

HRM literature (Elnaga and Imran, 2013; Sohal, 2013; Memon *et al.*, 2016), this result confirms the importance of the development of SC professionals. When this does not happen, SC professionals may rely on their network, but the company may not reap the full benefits in terms of SC competitiveness.

7. Conclusions and future developments

Our study contributes to addressing a gap in understanding the relationships between HRM and SCM in emerging markets from the perspective of KBV theory. This research has several possible theoretical and managerial contributions.

7.1 Theoretical contributions

This article characterizes the role SC employees have in acquiring and utilizing knowledge to support SC growth. It demonstrates the importance of training and development in enhancing these outcomes.

This focus (and related findings) contributes to the broader stream of literature that supports the KBV of organizations and SC (Barney *et al.*, 2001; Barney, 2012). It is based on the view that SCs are knowledge systems based on human capital, where knowledge creation processes benefit from the interaction with external sources (Möller and Halinen, 1999; Baron and Markman, 2000; Zacharia *et al.*, 2011; Kilubi and Rogers, 2018). We added to the evidence regarding these knowledge management dynamics by assuming the individual perspective and by considering specific external sources of knowledge.

From an HRM perspective, we demonstrate the importance of training initiatives to improve employees' job skills. Our results support prior literature arguing that investing in developing skills and competencies of employees has a direct impact on organizational performance (Crook *et al.*, 2011; Dubey and Gunasekaran, 2015b; Essex *et al.*, 2016; De Camargo Fiorini *et al.*, 2021). They also emphasize the role of training to engross collective knowledge and use it to improve skills (Elnaga and Imran, 2013; Sohal, 2013; Flöthmann *et al.*, 2018b). Firms able to provide high-quality training enhance the SC professionals' attachment to the organization, which translates into continuous commitment to stay (Jin *et al.*, 2010).

From an SCM perspective, we demonstrate the relevance of building a skilled workforce when the strategic objective is corporate growth (Dubey and Gunasekaran, 2015a; Gómez-Cedeño *et al.*, 2015). This demonstrates the value of nurturing the right human talent for SCM (Shub and Stonebraker, 2009; Flöthmann and Hoberg, 2017). Qualified professionals are the prerequisite for competitive SC, leading to long-lasting growth and efficiency. Knowledgeable SC employees influence other employees, to whom they can transfer their knowledge and skills to trigger further growth of the SC (Flöthman *et al.*, 2018a, b).

These perspectives were based on data from a developing country, Colombia, where SCM has become crucial for connecting the country, and training and development of employees can be a crucial component of success (Mejía Argueta *et al.*, 2020). Both topics are usually under-researched, and we hope that our findings will advance and enrich the relevant academic debate.

7.2 Managerial implications

Our results indicate that firms must actively enhance the skills of their employees, increasing their job satisfaction and resulting in growth. The strong and positive link between professional networking and job skills has important implications. At an individual level, SC professionals may reinforce and increase their skills by capitalizing on a large, diverse network of contacts with multidisciplinary job profiles. Professional networking is a

particularly important for growth when there are low investments in training. Thus, incentivizing SC employees to build stronger networks can support the organization's goals.

SC success is highly dependent on human talent. Hence, attracting and retaining the right professionals is a prerequisite to improving the effectiveness of SC operations. Nonetheless, there is a dearth of high-skilled SC employees in emerging countries like Colombia (Bogotá's Chamber of Commerce & UNDP, 2021). Although the Colombian workforce engaged in transport and logistics activities is large in numbers, individual productivity is low - roughly 15% of the productivity of an American worker (ILO, 2020). Furthermore, most of the jobs require only a high school diploma. Consequently, logistics operations use low-skilled employees, which increase the need for training.

The positive relationships between SC job competencies and job satisfaction on the one hand, and growth on the other, demonstrate that companies should support employee development. Investment in training improves the employees' and the organization's performance. This practice ensures long-term success as current skilled employees train new ones, ensuring knowledge transfer from one generation of employees to the next.

Public investment in training initiatives for SC professionals in companies can help. Developed countries (e.g. US, Singapore) have created training, apprenticeship and educational programs to build their future workforce through flexible, customized models that increase employment rates, skill gains, credential attainment and workplace capabilities. Others, like Finland, provide a tax incentive for firms that invest in education or training of their employees. Yet others, like Scotland have created a workforce development fund to up-skill and re-skill employees in multiple sectors. In developing countries, Mexico changed the article 132 of the National Labor Law in 2019 to include obligation for employers to provide all workers training in the workplace in order to enhance labor competency and productivity. However, Colombia still needs similar regulations and incentives to train and upgrade professional skills in order to improve productivity and SC growth.

7.3 Limitations and further development

This paper used data collected in Colombia. Future research may consider data from other countries, as well as larger sample sizes, including both longitudinal and broader data on each of the construct elements. A proper extension might control for cultural differences. Further research may focus on how social relationships are built. Research is also needed in order to determine how education and training should change to promote both soft and technical skills.

Our data collection process highlights certain limitations of our research. To minimize common method bias, future data collection should avoid capturing independent, moderating and dependent variables from the same individual at a single point in time. This will also prevent the possible bias resulting in questions about SC job skills, which require respondents to assess their own skills and competencies. There is also a need to control for the impact of economic growth across time in evaluating SC performance. Finally, more research is needed to broaden the understanding of the impact of employees' job satisfaction on SC performance, that are not captured by our research model. This will require the identification of suitable metrics that properly characterize SC operational outcomes (other than the strategic growth over time).

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Table A1.
Operationalization of constructs

Construct	Meaning	Main references	Indicators	Label
Professional networking	The extent of the network of relationships of the employees	Flap and Boxman (2017)	I have relationships with entrepreneurs in successful start-ups	REL 1
			I have relationships with executive managers in medium companies	REL 2
			I have relationships with decision makers in large firms	REL 3
Supply chain job skills and competencies	The level of soft and hard skills required for an SCM job	Derwik and Hellström (2017), Shou and Wang (2017), Flöthmann *et al.* (2018a)	I am able to identify and be oriented toward clear goals	SKILL 1
			I am able to take decision and solve problems efficiently	SKILL 2
			I am able to manage project and related resources	SKILL 3
			I have enough quantitative skills for my job	SKILL 4
Supply chain job satisfaction	The level of individual satisfaction about economic and non-economic job aspects	Nyberg (2010)	I am satisfied with my work environment	SAT 1
			I am satisfied with working hours	SAT 2
			I am satisfied with my competitive salary package	SAT 3
			I am satisfied with my non-economic incentives	SAT 4
			I am satisfied with my work-life balance	SAT 5
Investment in training	The level of company investments in corporate training programs	Rivera *et al.* (2016) Riley *et al.* (2016), Flöthmann *et al.* (2018b)	My company provides economic support for undergraduate studies	TRAIN 1
			My company provides economic support for post-graduate studies	TRAIN 2
			My company provides economic support for Logistics and SCM courses	TRAIN 3
			My company provides economic support for strategy and leadership courses	TRAIN 4
			My company provides economic support for courses in new technologies	TRAIN 5
Supply chain growth	The capability of the company and its supply chain to grow over time	Wu *et al.* (2014) Kilubi and Rogers (2018)	In the last 10 years, my company has increased the number of employees	PERF 1
			In the last 10 years, my company has increased the number of products or production lines	PERF 2
			In the last 10 years, my company has increased the number of suppliers	PERF 3

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