Factors influencing career advancement in supply chain management with gender perspectives: French case study

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Abstract

Purpose – The field of supply chain management (SCM) needs to attract and retain workers to solve the current talent shortage. The purpose of this research is to identify and evaluate factors that influence career advancement in SCM and compare male and female supply chain experts' perceptions of the importance of those factors.

Design/methodology/approach – First, 32 factors perceived as affecting career advancement in SCM were identified by conducting a literature review and consulting 36 experts. Those factors were grouped into four categories: "environmental and structural", "human capital", "individual" and "interpersonal". Those factors were validated via the Delphi method, and ten factors were retained for further study. Second, the voting analytical hierarchy process was used to determine the priority weights experts assigned to these factors. The weights assigned by male and female experts were compared to determine if there were differences between the women's and men's perceptions of the factors' importance.

Findings – The findings reveal that the category of human capital factors is the most important, followed by individual factors and the least important is interpersonal factors. The experts consulted for this research emphasized "skills", "a good fit between an individual and an organization" and "self-confidence" as important factors for career advancement. There were two unexpected results. First, the experts rejected all the environmental and structural factors. Second, no significant difference was found between the male and female groups' evaluations.

Originality/value – Prior to this study, no integrated approach to identify and evaluate the factors perceived which affect career advancement in SCM had been developed. This research is a single empirical and integrative study in France that provides valuable insights for academics and practitioners.

Keywords Career advancement, Supply chain management, Gender, Delphi, VAHP

Paper type Research paper

1. Introduction

Organizations, regardless of size (Khalil *et al.*, 2019), today consider supply chain management (SCM) strategically important (Choon Tan *et al.*, 2002). According to the Council of Supply Chain Management Professionals (CSCMP), [1] the SCM function includes such activities as logistics management and manufacturing operations. Supply chain (SC) experts coordinate intra- and inter-organizational processes with and across other functions and SC partners. Boards of directors acknowledge that SCM provides substantial value for organizations, as elucidated by Almatarneh *et al.* (2022). Furthermore, SCM has been recognized as providing competitive advantages, as discussed by Boon-itt *et al.* (2017). This recognition can be attributed to the increasing presence of SCM executives in boardrooms, notably Tim Cook, the chief executive officer (CEO) of Apple Inc., who previously held the position of senior vice president for

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worldwide operations, and Mary Teresa Barra, the CEO of General Motors, who previously served as the vice president of global product development, purchasing and SCM.

The SCM function is expected to grow by 11.2% from 2020 to 2027, and recruitment of SCM personnel is a priority [2]. However, organizations have been struggling to recruit and retain the necessary human talent for more than a decade (Cottrill, 2010); SCM departments are facing a "talent gap" (Makarius and Srinivasan, 2017) or "talent shortage" (Maloni *et al.*, 2017) and engaging in an implicit "talent war" (Ruel and Jaegler, 2021). In this context, some profiles are becoming "penurious"; not enough skilled workers are available for recruitment (Voak, 2020), and organizations are struggling to retain and develop their SC workers (Chen *et al.*, 2019). The issue of career attractiveness is closely intertwined with that of career advancement. Career advancement is "the evolving sequence of a person's work experiences over time" (Arthur *et al.*, 1989) and usually implies career mobility and promotion (Carmeli *et al.*, 2007). Organizations can make careers attractive by promising career opportunities (Oh *et al.*, 2016) and adequate starting salaries (Garver *et al.*, 2019). Providing opportunities for career advancement is therefore, the key to solve the SCM talent shortage (Maloni *et al.*, 2017).

Understanding the factors that influence SC workers' career advancement enables identifying measures organisations could implement to make SCM more attractive to candidates than it currently is Tang (2019). Making SCM attractive requires reinventing human resources (HR) policies to attract people who would not have entered SCM departments otherwise (Wehrle *et al.*, 2020). Reinventing HR policies could include implementing diversity and inclusion policies (Jonsen *et al.*, 2021) and including people far from the SCM function. Within the broader scope of diversity and inclusion, the issue of gender diversity is particularly relevant in SCM. Currently, statistics show that women are less than 40% of the entire workforce (Gartner and AWESOME, 2021, 2022). Recognizing the potential of gender diversity as a sustainable solution to the SCM talent gap, many leading companies (e [3] Mars, Cisco) are actively striving to attract women to their workforces. Thus, women's opinions are an important consideration for this research.

To our knowledge, no comprehensive and organized list of factors that affect SC workers' career advancement exists in the SCM literature. A few studies have tangentially discussed some of the factors that affect career advancement in SCM, e.g. French and Strachan (2009), Maloni *et al.* (2017) and Tatham and Kovács (2010) without classifying or ranking them.

Although these studies did not evaluate the factors they identified, their exploratory findings helped to generate a general list of SCM career advancement factors. Moreover, research on SCM career advancement factors has not examined whether they differ for women and men.

The present research attempts to identify and evaluate the factors that affect the career advancement of men and women working in SCM. To do so, this study seeks to answer the following research questions:

RQ1. What are the factors that impact SC workers' career advancement?

RQ2. How do women and men perceive the relative importance of various factors on their career advancement?

To answer these questions this study employs an integrated two-phase Delphi–analytical hierarchy process (AHP) approach (Azadeh *et al.*, 2009; Dohale *et al.*, 2021) and gathers data from 36 SC experts (18 women and 18 men) in France.

France was chosen as this study's geographic focus for several reasons. First, important SCM and logistics activities take place in France, which was among the first countries in Europe to consult the Logistics Performance Index [4]. Second, local regulations may impact career advancement, so focusing on one country avoids regulatory differences that could impact results. Third, our team had an important professional network in France that facilitated recruiting motivated experts with public track records (Gebhardt *et al.*, 2022).

This study contributes to the SCM literature in numerous ways. First, it contributes to an understanding of the factors that impede women's and men's career advancement in SCM by offering an exhaustive and categorized list of factors that can be used in future research. Second, it evaluates the differences and similarities in how the two groups perceive those factors. Our examination of those differences adds to the burgeoning literature on gender issues in SCM (Davis-Sramek and Richey, 2022; Miguel and Tonelli, 2023; Ruel *et al.*, 2020; Zinn *et al.*, 2018). Last, the study uses the social role theory (Eagly, 1987) to further discuss the factors that affect women's and men's career advancement in SCM. Beyond its theoretical implications, this research aims to have real managerial implications by assisting SCM employers in addressing the talent gap through the identification and ranking of factors that, according to both male and female SCM experts, impact SC workers.

The remainder of this article is structured into five sections. Section 2 presents a brief literature review. Section 3 explains the research approach. Section 4 analyses the empirical data. Section 5 discusses the results. Finally, Section 6 summarizes the findings, highlights the theoretical and managerial implications and details the study's limitations and future research directions.

2. Literature review

While the number of SCM jobs has been increasing [5], progress towards achieving gender parity in that industry remains stagnant. Even worse in certain technical SC professions, the number of women is decreasing (McKinsey, 2022). Despite the tensions in the SCM job market, little research exists on careers in SCM (Goffnett *et al.*, 2012). Of the few existing studies, most focus on operational and managerial roles (Garver *et al.*, 2019) and on the skills to be developed (Derwik and Hellström, 2017; Lutz *et al.*, 2021). Furthermore, much of this literature is now outdated as it was conducted in the 1990 and 2000s, e.g. Andre (1995), Lynagh *et al.* (1996), Knemeyer *et al.* (1999), Kau and Kleiner (2001). Nonetheless, recent research highlighting human capital's contributions to SC performance (Huo *et al.*, 2016; Patrucco *et al.*, 2022; Schleper *et al.*, 2021) is now reviving interest in SCM career issues (Garver *et al.*, 2019). This section reviews the scarce literature on SCM careers. It focuses specifically on women's careers because women's work could be a sustainable solution to the talent gap (Makarius and Srinivasan, 2017). This literature review discusses the limitations and gaps in academic literature and contextualizes our managerial research implications.

2.1 Supply chain management and general career considerations

According to Super (1957), a career is "an employee-employer relationship characterized by upward advancement and extrinsic reward" (p. 3). Betz *et al.* (1989) described three characteristics of a career: individuality, working environment and person-environment match. The main proxies for describing a career are age and seniority (Sullivan and Baruch, 2009). In the SCM field, some research has explored the strong links between "education" and "talent/skills gaps" (Allden *et al.*, 2018; Dubey and Gunasekaran, 2015; Sinha *et al.*, 2016; Trautrims *et al.*, 2016).

SCM professionals have different career expectations. Gibson and Lorin Cook (2003)'s survey showed that undergraduate students in SCM perceived the future components of their job with the following priority ranking: opportunities for advancement, job satisfaction, firm culture, salary, security, training and challenging and interesting work.

Lynagh *et al.* (1996) underlined that salary is the chief determinant of SC managers' job satisfaction. SC managers' job satisfaction could be further improved by variety, career opportunities and career growth (Goffnett *et al.*, 2012; Garver *et al.*, 2019) showed that, at the beginning of their careers, young graduates primarily consider salary, commuting distance

and fit with the company's culture when choosing a position. However, Burcher *et al.* (2005) study of Australian and British SC managers highlighted that the positive aspects of an SCM career are autonomy and variety while the negative aspects are poor advancement opportunities, heavy workloads and low compensation and benefits. Academics could play a role in preparing future SC actors for the reality of their careers (Goffnett *et al.*, 2012).

Making SCM careers attractive is a significant challenge. A study by DHL (2017), emphasised a 26% increase in manpower requirements. Demand for SC workers currently exceeds supply by a ratio of six to one. The talent shortage is obvious (Cottrill, 2010; Dubey and Gunasekaran, 2015; Maloni *et al.*, 2017), and firms must be proactive (Cottrill, 2010) in creating a pipeline (Solomon, 2010) of potential new talent. The number of university programmes in SCM is increasing despite high school and undergraduate students knowing little about SCM. Academics' role is crucial (Gardner, 2013).

2.2 Women's careers in supply chain management

Given the SCM talent gap (Fawcett *et al.*, 2010; Makarius and Srinivasan, 2017; Sinha *et al.*, 2016; Walden, 2020; Zinn *et al.*, 2018), it becomes evident that firms have compelling reasons to consider the inclusion of women within their workforce. Crucially, research, e.g. Lawrence *et al.* (2018), Ma *et al.* (2021), Ruel and Fritz (2021) has suggested that women's specific SCM skills can improve operational, financial and sustainable performance. The inclusion of women (Yawar and Seuring, 2017) and improving gender diversity are major issues in the SCM field (Kuzey *et al.*, 2022; Ruel *et al.*, 202) to which scholars and practitioners, e.g. Gartner (2020), Gartner and AWESOME (2021, 2022), OECD-FAO (2021) are paying attention. Gender diversity has practical, operational and strategic significance for firms because it improves desirable SCM assets such as creativity, innovation, decision-making and sustainability (Díaz-García *et al.*, 2013; Gligor *et al.*, 2022; Ruel and Fritz, 2021).

However, career progression gaps exist between women and men working in SCM. First, fewer women than men enter the workforce (Ruel and Jaegler, 2021; Gartner and AWESOME, 2022). Second, they encountered difficulties in accessing the upper hierarchical levels, leading to the proverbial "leaky pipeline" (Buckles, 2019; Mackenzie, 2015). The leaky pipeline is a phenomenon, where the women "disappear" from the workforce rather than advance in their careers (Alper, 1993). Women are often promoted less frequently than men and decide to change careers. Gartner and AWESOME (2022) noticed that organizations have made modest progress in retaining women until the middle of the pipeline. However, since women still lack access to top positions, they often leave organizations after working in middle-level positions.

Factors that positively or negatively affect women's career advancement in SCM specifically are scattered throughout the literature. Among the positive factors thus far identified are "support from senior SCM staff or mentors within the firm" (Maloni *et al.*, 2019; Nix and Stiffler, 2016), "initial training" (Flöthmann and Hoberg, 2017; French and Strachan, 2009), "encouragement to pursue further training throughout one's life" (Knemeyer *et al.*, 1999; Sinha *et al.*, 2016), "SCM hard, soft and managerial skills" (Kolasińska-Morawska *et al.*, 2019), "human resource management policies for gender diversity" (Flöthmann and Hoberg, 2017; Larson and Morris, 2014; Nix and Stiffler, 2016) and "a binding legal environment for gender equity" (French and Strachan, 2009). Negative factors discouraging women's career progressions in SCM include "work-life balance and career interruption linked to motherhood" (Johnson *et al.*, 1999; Kau and Kleiner, 2001; Lynagh *et al.*, 1996; Maloni *et al.*, 2019), "male hierarchy" (Carter and Jennings, 2002; Cooper *et al.*, 2000; Min and Lambert, 2002; Şentürk *et al.*, 2021) associated with a form of "homophily" (Lawrence *et al.*, 2018) and "usual discrimination against women" (also called "statistical discrimination"), which is often linked to stereotypes (Keller and Ozment, 2009; Kolasińska-Morawska *et al.*, 2019; Larson and Morris, 2014; Nix and Stiffler, 2016).

The complete and organized set of factors that positively or negatively affect women's and men's career progressions in SCM is discussed in Sub-section 4.1.

2.3 Research gap

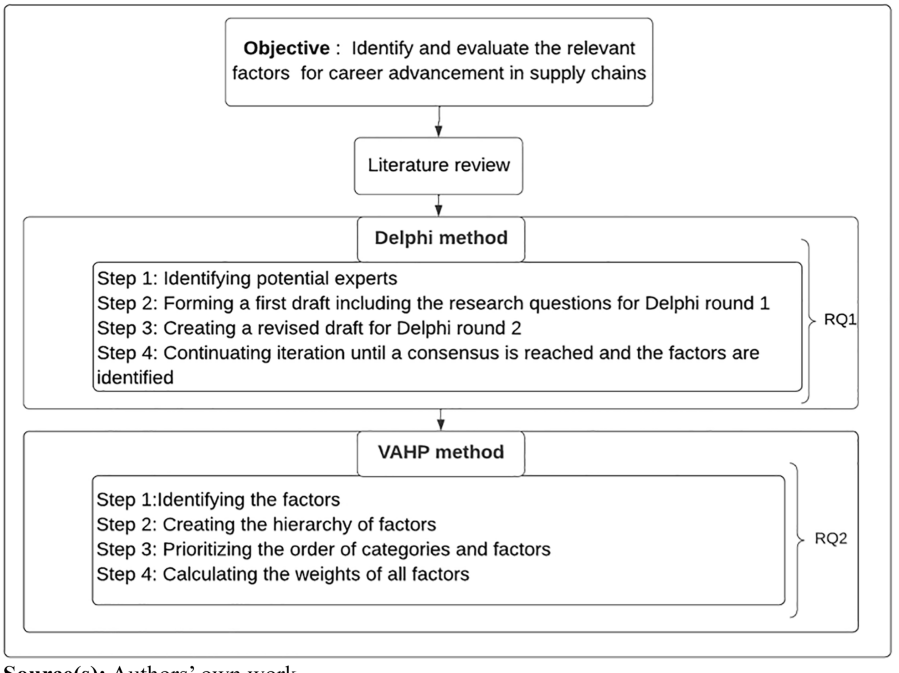
The literature on career advancement in SCM is scarce but mentions of factors that positively or negatively affect SC workers' career advancement are scattered within research studies published in the last three decades. Those studies mainly suggest that there are differences between women's and men's experiences of advancing in the SCM field. However, the studies either do not consider a complete and organized set of factors that influence SC workers' experiences or do not rely on empirical data.

This literature review establishes the necessity of studying the factors that affect SC workers' career advancement. Examining those factors helps professionals and academics focus on the factors (Ruel and Jaegler, 2021) that most significantly attract workers to the SCM function. This study identifies and evaluates the career advancement factors for women and men in SCM. It is empirical and integrative, situated in France, and supplemented by relevant experts' opinions.

3. Research approach

The research included two principal phases for identifying and prioritising career advancement factors, as shown in Figure 1.

In the first phase, the Delphi method was used to answer RQ1 and categorise the career advancement factors identified in the literature review. Several studies have established significant reasons for using the Delphi method to identify factors from experts' opinions



Source(s): Authors' own work

Figure 1.
Research approach

(Di Zio *et al.*, 2021; Dohale *et al.*, 2021). The Delphi method is beneficial when collective judgments would help resolve the issue in question and when group dynamics do not allow for effective communication. It is also useful when objective data and experimental research are not possible or when empirical evidence is inadequate (Rowe and Wright, 2001). For all of these reasons, this study adopted the Delphi method to identify career advancement factors.

To answer RQ2 in the second phase, the voting analytical hierarchy process (VAHP) method was used to establish an initial hierarchical structure for the factors. It also served to determine the importance of each factor identified by the expert group. Unlike the pairwise comparisons used in AHP, VAHP calculates factors' relative weights by voting at different points (Liu and Hai, 2005) and evaluates them, using ranked-voting data and the rank-ordering method that Noguchi *et al.* (2002) proposed.

Azadeh *et al.* (2009), Emovon *et al.* (2018) have demonstrated several advantages of using VAHP rather than other multi-criteria decision-making (MCDM) methods. VAHP is easy to understand and explain. It also provides all experts with equal chances to vote and freely evaluate the factors (Soltanifar and Lotfi, 2011). By combining the Delphi and VAHP methods, we can leverage each method's strengths and overcome their limitations (Azadeh *et al.*, 2009; Dohale *et al.*, 2021). The Delphi method is used to gather expert opinions on criteria that are then integrated into the VAHP analysis, via which the criteria's weights are calculated. Using expert opinion ensures that the VAHP analysis examines relevant criteria. VAHP is, in turn, utilized to systematically rank the criteria based on the agreed-upon weights.

The details of the Delphi method are discussed in Sub-section 3.1, and the details of the VAHP method are discussed in Sub-section 3.2.

3.1 Delphi method

The Delphi method was employed to identify the essential factors that affect SC workers' career advancement. Four steps (Rowe and Wright, 2001) were followed:

Step 1: Identify potential experts.

Identifying potential experts required determining the number of experts to recruit for the study and selecting qualified experts. A sample of between 5 and 20 experts is statistically appropriate (Dohale *et al.*, 2021; Emovon *et al.*, 2018). A Delphi study requires qualified experts, who have a deep understanding of the issues being investigated. Dohale *et al.* (2021) considered individuals to be experts if they fulfilled two essential criteria: (1) having knowledge on and experience with the topic of investigation and (2) being motivated to participate. The experts consulted in a Delphi study are not a statistical sample intended to be representative of any population (Dalkey *et al.*, 1969; Tavana *et al.*, 2016).

In this study, an invitation was posted on LinkedIn. Experts in SCM with at least 10 years of experience were invited to give their opinions on career advancement. Several volunteers responded, expressing their interest and specifying their availability. Then, to avoid losing participants in each round, a personalized e-mail was sent to each volunteer to explain that the study would contain several rounds and would require a commitment on their part. In total, 36 experts (18 women and 18 men) were selected and contacted between October 2021 and January 2022. These experts were SC directors and managers, logistics directors and operations managers. Table 1 presents the respondents' information and profiles.

On average, the experts had 21.15 years of experience, with a minimum of 10 years and a maximum of 36 years.

Step 2: Form the first version of a questionnaire, including the research topic questions, and submit it to the experts for Delphi round 1.

Number	Gender	Position	Type of organization/	Years of work experience
1	Female	Supply chain manager	Electronic industry	10
2	Female	Operation manger	Transportation rail sector	20
3	Female	Global head of supply chain planning	Fashion sector	12
4	Female	Supply chain manager	Building materials and equipment distribution sector	15
5	Female	Demand and supply planning manager	Food supply chain	24
6	Female	Procurement manger	Retail industry	20
7	Female	Supply chain manger	Retail industry	12
8	Female	Supply chain manger	Biotechnology research	21
9	Female	Supply chain manager	Construction industry	20
10	Female	Global supply chain project director	Cosmetics industry	16
11	Female	Supply chain manager	Aerospace industry	13
12	Female	Operation manger	Chemical manufacturing	25
13	Female	Supply chain manager	Food supply chain	25
14	Female	Supply chain manger	Fashion sector	12
15	Female	Supply chain manager	Food supply chain	30
16	Female	Planning and procurement manger	Cosmetics industry	25
17	Female	Supply chain manager	Construction industry	30
18	Female	Supply chain Manger	Retail industry	30
19	Male	Supply chain director	Fashion sector	30
20	Male	Operation Manger	Automotive sector	36
21	Male	Logistics site director	Automotive sector	20
22	Male	Supply chain director	Retail industry	25
23	Male	Supply chain manager	Retail luxury goods and jewelry	25
24	Male	Supply chain director	Beauty and fragrance industry	14
25	Male	Supply chain director	Food supply chain	20
26	Male	Supply chain director	Pharmaceutical manufacturing	13
27	Male	Industrial director	Electric manufacturing	20
28	Male	Supply chain director	Food supply chain	20
29	Male	Logistic director	Beverage manufacturing	25
30	Male	Supply chain director	Fashion industry	20
31	Male	Senior supply chain manager	Oil and gas industry	18
32	Male	Logistic director	Food and beverage manufacturing	30
33	Male	Supply chain expert	Consulting	15
34	Male	Supply chain director	Construction industry	25
35	Male	Logistic director	Transportation sector	25
36	Male	Supply chain director	Furniture industry	20

Source(s): Authors' own work

Table 1. Respondents' information

Step 3: Revised questions based on the results of Delphi round 1, and provide those questions, along with the results to the experts for Delphi round 2.

Step 4: Continue iterating until the experts reach a consensus as to which factors to be identified as relevant for further research.

Typically, the experts reach a consensus by the second or third Delphi round (Emovon *et al.*, 2018).

This research used the content validity ratio (CVR) technique (Lawshe, 1975) to measure consensus and evaluates the validity of the factors identified by the experts in terms of how useful they were for achieving the study's objective. The CVR is a user-friendly and transparent measurement technique that uses a three-point scale (i.e. essential, useful but not essential, not necessary) (Ayre and Scally, 2014). Items considered "essential" by a critical number of experts are included in the final evaluation, and items failing to reach this critical level are rejected. This measurement uses a critical threshold value as a reference (Dohale *et al.*, 2021; Emovon *et al.*, 2018; Lawshe, 1975). Moreover, the CVR has been reevaluated (Almatarneh *et al.*, 2022). The CVR is calculated as follows:

$$CVR = \frac{N_{PE} - \frac{N}{2}}{\frac{N}{2}}, \tag{1}$$

where:

CVR = Consistency validity ratio,

N_{PE}: The number of experts indicating the factor is essential and

N = Total number of experts.

In this study, the CVR threshold value for a factor to be selected was 0.29 (Emovon *et al.*, 2018; Lawshe, 1975). Their relative importance was calculated using the VAHP method.

3.2 Voting analytical hierarchy process (VAHP) method

In the second phase, the VAHP method was applied to rank the factors that affect SC workers' career advancement that the experts interviewed for the study had identified. The present study followed these steps (Liu and Hai, 2005):

Step 1: Identify the factors.

Step 2: Create a hierarchical structure for factors, including categories, factors and alternatives.

Step 3: Rank the categories and factors.

The factors were ranked in terms of importance. The number of voters (experts) is n. Usually, the n is necessary for VAHP ranges from 8 (Pishchulov *et al.*, 2019) to 60 (Liu and Hai, 2005). The number of factors the experts can rank is S and R, and S ≤ R. Each expert ranks S factors by assigning them a value from 1 to S.

Step 4: Calculate the weights of all the factors.

This study used the voting and ranking model (strong-ordering model) that Noguchi *et al.* (2002) proposed, which evaluates the weights of all of the factors using the linear programming–based DEA formulation. The mathematical model is defined as:

$$\theta_{rr} = \max_{r=1..R} \sum_{s=1...S} u_{rs} x_{rs}$$

subject to,

$$\theta_{rp} = \sum_{s=1...S} u_{rs} x_{rp} \leq 1 (p = 1, 2..R)$$

$$u_{r1} \geq 2u_{r2} \geq 3u_{r2}..\geq S u_{rS}$$

$$u_{rS} \geq \varepsilon$$

$$\varepsilon = \frac{2}{n * S(S+1)}.$$

In this model, θ_{rr} is the weighted sum of the votes to the r^{th} factor, S is the number of factors voters can rank (where S ≤ R), R is the number of factors, u_{rs} is the weight of the s^{th} place concerning the r^{th} factor and x_{rs} are the total votes for the r^{th} factor at the nth place by n voters. Noguchi's strong-ordering model was applied separately to calculate the weight of each factor (Noguchi *et al.*, 2002). Then, the initial weights were normalised to determine the final weights and overall ranking. Section 4 explains the detailed application of this approach.

4. Empirical study: Delphi–VAHP application

This section details the application of the Delphi–VAHP approach to identify and evaluate the factors that affect male and female SC workers' career advancement.

4.1 Defining the main factors using Delphi

A literature review and the Delphi method were used to identify the factors SC experts consider most relevant for SCM career advancement. First, the SCM literature was examined to identify essential factors that affect SC workers' careers. We reviewed 127 general management papers and identified 40 factors distributed across four categories (Cappellen and Janssens, 2005; Kirchmeyer, 1998): environmental and structural factors, human capital factors, individual factors and interpersonal factors. We then determined which of those factors were mentioned, however briefly, in papers specifically discussing careers in SCM. We found 23 factors from the first list in the papers we examined. For the sake of brevity, this study only lists papers unambiguously concerned with the SCM field. The factors were organized into the four aforementioned categories and are defined in Table 2.

The relevance of the identified factors was checked using expert judgment as revealed by the Delphi method. Both the quantity of experts consulted and the quality of their responses guarantee the validity of the results obtained. The men's and women's responses were studied separately to compare them and stimulate discussion.

A questionnaire (Appendix 1) with a 20-min response time was used in Delphi round 1. To identify the factors that impact career advancement in SCM, we asked the experts to evaluate each of the 23 factors identified from the literature review on a three-point scale (essential, useful but not essential and not necessary) (Ayre and Scally, 2014). The experts could also add unlisted factors they thought were essential.

In Delphi round 1, the experts added nine new factors to our list. Three factors were added to the environmental and structural factors category: framework (company size, value, strategy and reputation), compensation and available resources (technological/financial/material). Mastering one or two foreign languages appeared in the human capital category. Four factors were added to the individual factors category: geographic mobility, being well-dressed, curiosity and ability to innovate and be creative. Recognition of peers for contributions to the SC sector (e.g. articles and conferences) was added to the interpersonal factors category. The literature review and Delphi round 1 yielded a list of 32 factors that was then assessed in Delphi round 2 (Table 3). Round 2 utilized a questionnaire (Appendix 2) with a 10-min response time.

Two Delphi rounds were conducted to reach a consensus among the experts. All of the factors' CVR scores, for all experts and for women and men separately, were calculated using equation (1). Factors with a CVR ≥0.29 were further analysed in this study. The objective was to determine which factors were deemed important influences on career advancement by both men and women.

Table 2. Identified factors for career advancement in SCM

Category	Definition of factor	References
Environmental and structural factors	*A male Maleagerial hierarchy* composed predominantly of men is a critical factor influencing the processes affecting the managerial advancements of men and women	Lynagh *et al.* (1996), Johnson *et al.* (1999), Cooper *et al.* (2000), Carter and Jennings (2002), Min and Lambert (2002), Kau and Kleiner (2001), French and Strachan (2009), Nix and Stiffler (2016), Zinn *et al.* (2018), Şentürk *et al.* (2021)
	Structural discrimination based on some generalizations about attributes of average group members constitutes stereotypes (e.g. against gender and cultural background)	Andre (1995), Lynagh *et al.* (1996), Knemeyer *et al.* (1999), Kau and Kleiner (2001), Min and Lambert (2002), French and Strachan (2009), Keller and Ozment (2009), Larson and Morris (2014), Nix and Stiffler (2016), Kolasińska-Morawska *et al.* (2019)
	Homophily. For instance, the preference to work with people like us, who have, for example, the same culture or followed the same studies	Johnson *et al.* (1999), Lawrence *et al.* (2018)
	Internal labor market comprises job types that allow advancement within the organization where an individual already works	Larson and Morris (2014), Nix and Stiffler (2016), Flöthmann and Hoberg (2017), Maloni *et al.* (2017), Zinn *et al.* (2018)
	Having started in favorable conditions is seen as a factor for the next career advancements	Andre (1995), Johnson *et al.* (1999), Knemeyer *et al.* (1999), Garver *et al.* (2019)
	Legislation and social regulation may bring equal opportunity in employment status	French and Strachan (2009)
Human capital factors	*Education* provides the necessary knowledge, skills, and credibility required at higher positions in the hierarchy	Andre (1995), Lynagh *et al.* (1996), Johnson *et al.* (1999), Larson and Morris (2008), Keller and Ozment (2009), Trautrims *et al.* (2016), Flöthmann and Hoberg (2017), Zinn *et al.* (2018), Kolasińska-Morawska *et al.* (2019)
	Skills: they may be soft, hard or managerial. Managerial skills include problem-solving, decision-making, goal setting, planning, interpersonal and communication skills, leadership and supervision, administrative skills and mechanics of management	Sinha *et al.* (2016), Kolasińska-Morawska *et al.* (2019), Ruel and Fritz (2021)
	The work experience accumulated since the beginning of the career, e.g. the total number of years and experiences abroad	Knemeyer *et al.* (1999), Ciliberti *et al.* (2008), French and Strachan (2009), Larson and Morris (2008, 2014), Sinha *et al.* (2016), Flöthmann and Hoberg (2017), Zinn *et al.* (2018), Ruel and Jaegler (2021)
	The number of hours worked per week may have a positive influence on career advancement	Min and Lambert (2002), Larson and Morris (2014), Zinn *et al.* (2018)
	A good fit between an individual and an organization can help individuals to develop knowledge, skills, credentials, credibility, and, thus, expertise	Autry and Daugherty (2003), Zinn *et al.* (2018), Garver *et al.* (2019)
	Training and development	French and Strachan (2009), Sinha *et al.* (2016), Flöthmann and Hoberg (2017), Zinn *et al.* (2018), Patrucco *et al.* (2022)

(*continued*)

Table 2.

Category	Definition of factor	References
Individual factors	*Age* is seen as having a positive association with career advancement because it brings more work experience	Andre (1995), Lynagh *et al.* (1996), Johnson *et al.* (1999), Knemeyer *et al.* (1999), Autry and Daugherty (2003), Ciliberti *et al.* (2008)
	Self-confidence, self-promotion, and proactive personality create situations that enhance the likelihood of high-level job performance	Benson and Chau (2017)
	Self-monitoring and having emotional stability. Those traits are known as enhancing mentor support, career encouragement and training and development, which, in turn, led to managerial advancement	Kolasińska-Morawska *et al.* (2019), Şentürk *et al.* (2021)
	Masculinity instrumentality, ambition, leadership motivation. This factor is linked to the gender schema theory, which states that individuals high in the 'masculine gender role' (defined as instrumental, task-oriented and problem-solving oriented) process information in "masculine" terms	Kolasińska-Morawska *et al.* (2019), Jermsittiparsert and Srihirunc (2019)
	Femininity traits comprise expressive, empathetic, and communal ones, according to the gender schema theory, and are seen as negatively related to career advancements	Kolasińska-Morawska *et al.* (2019), Şentürk *et al.* (2021)
	General cognitive ability. This factor refers to how much and how quickly an individual learns and is positively related to advancement because it enables the learning needed for complex jobs, such as management	De Vericourt *et al.* (2013)
	Home status, the presence of a spouse and dependents may influence work experience and, thus, career advancement	Lynagh *et al.* (1996), Johnson *et al.* (1999), Knemeyer *et al.* (1999), Kau and Kleiner (2001), French and Strachan (2009), Tatham and Kovács (2010), Nix and Stiffler (2016), Maloni *et al.* (2019)
Interpersonal	*Career encouragement and mentoring* that comprises sponsorship and provides challenging work, protection and coaching	Andre (1995), French and Strachan (2009), Zinn *et al.* (2018), Maloni *et al.* (2019)
	Hierarchical superior support provides important career encouragement	Maloni *et al.* (2019)
	Informal social and formal networks are considered as providing opportunities because they possess valuable information or may interact in negotiations	Knemeyer *et al.* (1999), Nix and Stiffler (2016), Flöthmann and Hoberg (2017), Zinn *et al.* (2018), Patrucco *et al.* (2022)
	Educational encouragement. Parental encouragement to achieve goals, especially about education, is seen as an important factor influencing individuals' capability to advance in their careers	Knemeyer *et al.* (1999)

Source(s): Authors' own work

Table 3.
The CVR values of retained criteria through Delphi

Category	Definition of factor	Definition's source	CVR value Women's group	Men's group	All experts
Environmental and structural factors	A male managerial hierarchy	Literature	−1 Rejected	−0.89 Rejected	−0.94 Rejected
	Structural discrimination	Literature	−0.89 Rejected	−1 Rejected	−0.94 Rejected
	Homophily	Literature	−0.89 Rejected	−1 Rejected	−0.94 Rejected
	Internal labor market	Litterateur	−0.11 Rejected	−0.11 Rejected	−0.11 Rejected
	Having started in favorable conditions	Literature	−0.11 Rejected	0 Rejected	−0.06 Rejected
	Legislation and social regulation	Literature	−0.56 Rejected	−0.78 Rejected	−0.67 Rejected
	The framework	Experts' opinions	0.11 Rejected	−0.33 Rejected	−0.17 Rejected
	The available resources	Experts' opinions	−0.11 Rejected	−0.11 Rejected	−0.11 Rejected
	Adequate compensation for the work	Experts' opinions	−0.11 Rejected	−0.22 Rejected	−0.17 Rejected
Human capital factors	Education	Literature	0 Rejected	−0.22 Rejected	−0.11 Rejected
	Skills	Literature	*0.67 Accepted*	*0.56 Accepted*	*0.61 Accepted*
	The work experience accumulated since the beginning of the career	Literature	0.22 Rejected	0.22 Rejected	0.22 Rejected
	The number of hours worked per week	Literature	−0.78 Rejected	−0.33 Rejected	−0.50 Rejected
	A good fit between an individual and an organization	Literature	0.22 Rejected	*1 Accepted*	*0.61 Accepted*
	Training and development	Literature	−0.11 Rejected	−0.11 Rejected	−0.11 Rejected
	Mastering one or two foreign languages	Experts' opinions	*0.56 Accepted*	*0.67 Accepted*	*0.61 Accepted*

(*continued*)

Table 3.

Category	Definition of factor	Definition's source	CVR value Women's group	Men's group	All experts
Individual factors	Age	Literature	−0.67 Rejected	_-0.89 Rejected	−0.78 Rejected
	Self-confidence	Literature	*0.67 Accepted*	*0.89 Accepted*	*0.78 Accepted*
	Self-monitoring	Literature	*0.33 Accepted*	*0.33 Accepted*	*0.33 Accepted*
	Masculinity	Literature	*0.33 Accepted*	*0.56 Accepted*	*0.44 Accepted*
	Femininity	Literature	0.11 Rejected	0.11 Rejected	0.11 Rejected
	General cognitive ability	Literature	*0.33 Accepted*	*0.33 Accepted*	*0.33 Accepted*
	Home status	Literature	−0.89 Rejected	−1 Rejected	−0.94 Rejected
	Ability to innovate and be creative	Experts' opinions	*0.56 Accepted*	*0.67 Accepted*	*0.61 Accepted*
	Curiosity and motivation to get out of your comfort zone	Experts' opinions	*0.44 Accepted*	*0.78 Accepted*	*0.61 Accepted*
	Being well-dressed and presented	Experts' opinions	0 Rejected	−0.33 Rejected	−0.33 Rejected
	Geographic mobility	Experts' opinions	−0.11 Rejected	−0.11 Rejected	−0.11 Rejected
Interpersonal	Career encouragement and mentoring	Literature	−0.11 Rejected	0 Rejected	−0.06 Rejected
	Hierarchical superior support	Literature	*0.56 Accepted*	0.22 Rejected	*0.39 Accepted*
	Informal social and formal networks	Literature	−0.56 Rejected	−0.44 Rejected	−0.50 Rejected
	Educational encouragement	Literature	−0.56 Rejected	−1 Rejected	−0.78 Rejected
	The recognition of peers	Experts' opinions	−0.44 Rejected	−0.33 Rejected	−0.39 Rejected

Source(s): Authors' own work

All three expert groups rejected all of the factors in the environmental structure category. In the human capital category, all three expert groups accepted skills and mastering one or two foreign languages. The all-experts group and the men's group accepted "a good fit between an individual and an organization", but the women's group rejected it. In the individual factors category, all three expert groups accepted six factors: self-confidence, self-monitoring, masculinity and ambition, general cognitive ability, curiosity and ability to innovate. The only interpersonal factor accepted was "hierarchical superior support". It was accepted by the all-experts group and the women's group but rejected by the men's group. In general, there was no marked difference between the CVR scores the women's and men's groups assigned to the factors. The exceptions to this trend were the women's group's rejection of "a good fit between an individual and an organization" and the men's group's rejection of "hierarchical superior support". Both factors were retained for the next phase because the all-experts group accepted them. The entire list of retained and rejected factors is shown in Table 3.

In total, 16 of the 23 original factors were rejected and 6 of the 9 additional factors were rejected. About 10 of the 32 factors initially identified were retained.

4.2 Determining the weights of factors using VAHP

The priority weight of each factor accepted in the first phase (Table 3) was calculated using VAHP and based on the proposed hierarchical structure (Figure 2). The experts then ranked the factors in terms of their importance for career advancement in SCM (Tables 4 and 5), assigning each one a position from 1 to n (1 = most important) on the questionnaire presented in Appendix 3.

All of the factors' priority weights and the rankings of the three expert groups were calculated (Table 6).

According to the experts, the human capital factors are the most important (0.364) to consider when assessing one's prospects for advancing in an SCM career. The second most important (0.350) are the individual factors and the least important are the interpersonal factors (0.286). In the human capital category, the all-experts group identified "a good fit between an individual and an organization" as the most important factor shaping career advancement in the SCM field (0.427). However, the women's group, which had rejected this factor in the Delphi study, ranked this factor as the second-most important factor in the category. In the individual factors category, the all-experts group identified self-confidence as the most important factor (0.229). The women's and men's groups ranked the factors in this category the same. The only factor retained in the interpersonal factors category was "hierarchical superior support".

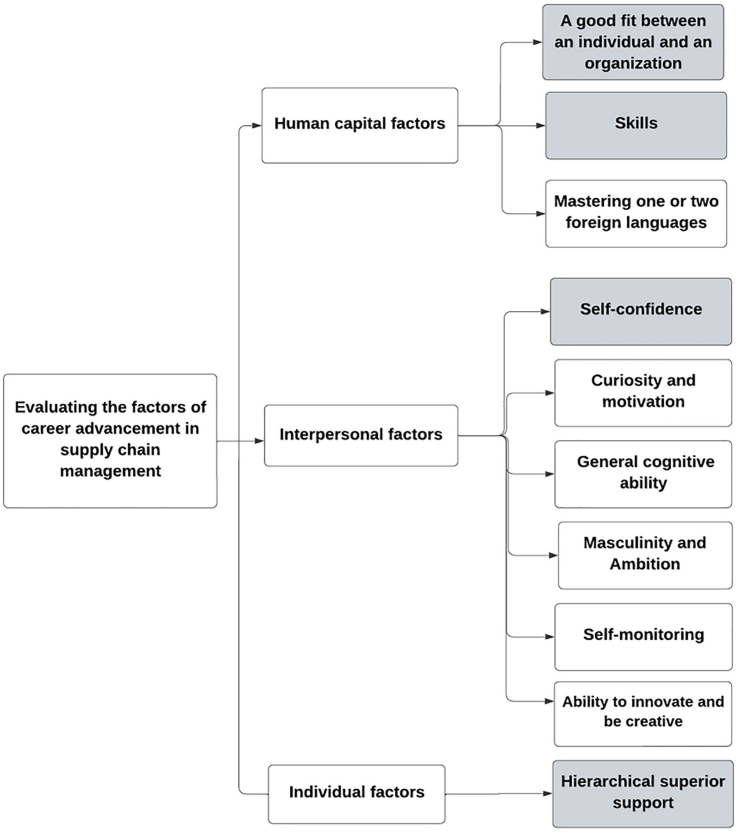
The men's group's ranking resembles the all-experts group's general ranking. In the women's group's ranking of the human capital factors, the "skills" factor ranked higher than "a good fit between an individual and an organization" (in grey, Figure 2).

The all-experts group identified "a good fit between an individual and an organization" as the most important factor in the human capital category. In the individual category, self-confidence was the most important factor. Only the "hierarchical superior support" factor was retained in the interpersonal category.

Thus, this study employed the Delphi–VAHP approach to identify and evaluate the factors affecting women's and men's career advancement in the SCM field. With these results, the following section explores a comprehensive discussion of the findings and their implications.

5. Discussion

In this discussion, we meticulously analyze and interpret the findings of our research.While the literature on human resources management (HRM) has examined four categories of



Source(s): Authors' own work

Figure 2. Hierarchical structure for factors in career advancement in SCs

Human capital factors	Votes 1st	2nd	3rd
Skills	16	16	8
A good fit between an individual and an organization	24	12	4
Mastering one or two foreign languages	0	12	28

Source(s): Authors' own work

Table 4. Ranking data within the human capital category

Individual factors	Votes 1st	2nd	3rd	4th	5th	6th
Self-confidence	14	9	3	7	2	5
Self-monitoring	4	5	7	4	12	8
Masculinity and ambition	4	7	11	5	8	5
General cognitive ability	6	7	4	12	9	2
Curiosity and motivation to get out of your comfort zone	9	8	11	6	0	6
Ability to innovate and be creative	3	4	4	6	9	14

Source(s): Authors' own work

Table 5. Ranking data within the individual category

Category weights	Factors	Priority weights for all experts	Normalized weights for all experts	Ranking for all experts	Ranking for women's group	Ranking for men's group
Human capital (0.364)	Skills	0.851	0.364	2	1	2
	A good fit between an individual and an organization	1	0.427	1	2	1
	Mastering one or two foreign languages	0.489	0.209	3	3	3
Individual factors (0.350)	Self-confidence	1	0.229	1	1	1
	Self-monitoring	0.603	0.138	5	5	5
	Masculinity and ambition	0.660	0.152	4	4	4
	General cognitive ability	0.710	0.163	3	3	3
	Curiosity and motivation to get out of your comfort zone	0.852	0.196	2	2	2
	Ability to innovate and be creative	0.532	0.122	6	6	6
Interpersonal factors (0.286)	Hierarchical superior support	1	1	1	1	1

Source(s): Authors' own work

Table 6. Priority weights of factors

factors (Kirchmeyer, 1998) that influence career advancement (i.e. environmental and structural factors, human capital factors, individual factors and interpersonal factors), the results show that the human capital factors category was the most important for SC workers to consider when assessing their career advancement prospects. This result is consistent with that of Schleper *et al.* (2021) study.

Besides, the panel of experts assessed the environmental and structural factors as irrelevant to SC workers' career advancement.

This result suggests that internal factors (i.e. human capital, individual and interpersonal factors) have more of an effect on SC workers' career advancement than environmental and structural factors.

Nonetheless, those external factors can be considered to positively or negatively bias an employee's chances of advancing in their career (Chong and Leong, 2017), especially for women (Tharenou, 1990). In this study, we note that the experts believe that such external "biases" do not (or will not) exist when pursuing a career in SCM. Overall, the experts disregarded the environmental and structural factors in favor of numerous personal factors (6), a few human capital factors (3) and a single interpersonal factor. Our findings contrast with those of previous SCM research highlighting the importance of the environmental and structural category (Gammelgaard and Larson, 2001; Trautrims *et al.*, 2016). The results of this study contradict the work of Betz *et al.* (1989), who argued that a career depends on individuals, their environment and their fit within that environment.

Yet, the scarce SCM literature that focuses on career issues (Goffnett *et al.*, 2012) and, more specifically, on women's careers in SCM and glass-ceiling issues, e.g. Lynagh *et al.* (1996) continually highlights environmental factors as barriers to women's career progression (Table 3). However, the experts in this study rejected the importance of factors other scholars have argued have a negative impact on women's career advancement in SCM, including

"male managerial hierarchy" e.g. Johnson *et al.* (1999), Kau and Kleiner (2001), Lynagh *et al.* (1996), Nix and Stiffler (2016), Zinn *et al.* (2018), "structural discrimination", e.g. Andre (1995), Knemeyer *et al.* (1999), Kolasińska-Morawska *et al.* (2019), Larson and Morris (2014), Min and Lambert (2002), "home status", e.g. French and Strachan (2009), Maloni *et al.* (2019), Tatham and Kovács (2010) and "informal social and formal networks", e.g. Flöthmann and Hoberg (2017), Knemeyer *et al.* (1999), Nix and Stiffler (2016), Zinn *et al.* (2018). Furthermore, although the scientific literature regularly highlights mentoring's crucial and positive effect on women's career advancement in SCM (Andre, 1995; French and Strachan, 2009; Maloni *et al.*, 2019; Zinn *et al.*, 2018), the women in this study eliminated that factor (in the interpersonal category). Through brief discussions with some of the female experts, we determined that they sometimes considered the factors that they felt were the "fairest" bases for determining career advancement and decided to dismiss any potential negative factors.

Like myriad other studies on gender issues, this one raises questions of social identity and, more specifically, that of female experts. The social role theory (Eagly, 1987), which SCM researchers have used (Ruel and Jaegler, 2021) may explain why individuals would choose to behave according to gendered stereotypes. The women's and men's groups both accepted masculinity as a factor that has an important impact on SC workers' career advancements and rejected femininity. The few differences between the two groups' factor selections can be examined through social role theory. Given that the academic literature on SCM and professional reports highlight many gender gaps in SCM, we did not expect to find so little difference between the women's and the men's assessments of which factors affect workers' career advancement in SCM.

A paradox emerges and raises some questions: Does this signal a form of conformity (social role theory; Eagly, 1987) by women experts to a male-dominated environment that leads them to reject the importance of factors usually designated as significantly impacting women's careers? Are firms' SCM departments becoming more inclusive and gender diverse as firms work to reduce the talent gap (Davis-Sramek and Richey, 2022; Miguel and Tonelli, 2023; Ruel *et al.*, 2020; Zinn *et al.*, 2018)? The few studies that have raised the issue of environmental factors as barriers to women's SCM careers are often from the 1990s. While the most recent statistics show that there are still fewer women than men in the total SCM workforce, they also suggest there have been some improvements in gender diversity. Therefore, it is likely that women experts in this study are indeed more optimistic about their career progress than their female forebears were.

The experts consulted for this research emphasized "skills", "a good fit between an individual and an organization" and "self-confidence" as important factors for career advancement. These results echo those of the scarce research on SCM that focuses on soft skills.

Bak *et al.* (2019), Christopher (2012), Cottrill (2010), Ellinger and Ellinger (2013), Fawcett *et al.* (2010) and the few studies on personality traits and self-confidence in the SCM field (Nazempour and Yang, 2019). This study identifies career advancement factors that expert SC professionals consider important but that have received insufficient attention from SCM researchers. For example, the experts identified "foreign-language proficiency" as important, but researchers have not extensively researched its role in SCM careers. Similarly, the experts suggested that "curiosity" and "ability to innovate and be creative" be added to the list of important factors and retained throughout the different phases of this research. Researchers working on purchasing and supply management have extensively explored the latest factors, e.g. Viale *et al.* (2023), but SCM researchers have not done likewise.

6. Conclusion

This study employed an integrated two-phase Delphi–VAHP approach to identify and evaluate the factors influencing career advancement among SC workers. Data were gathered from 36 SC experts in France, encompassing both women and men.

The investigation explored the perceptions of both genders regarding the significance of various factors associated with career advancement in the field of SCM. Four distinct categories of factors, drawn from existing literature, were identified: environmental and structural, human capital, individual and interpersonal factors.

The findings revealed that the category of human capital factors was the most important. The second-most important category was individual factors and the least important was interpersonal factors. Both women and men agreed on this ranking and rejected all the environmental and structural factors.

The men's and women's groups almost validated the same factors in each category. First, the human capital factors category included "skills", "a good fit between an individual and an organization" and "mastering one or two foreign languages". The men's group considered "good fit between an individual and an organization" to be the most important factor. Contrastingly, the women's group rejected it in Delphi round 1 and ranked it as the second-most important factor in the second round. The women considered "skills" to be the most important factor. Second, the individual factors category included "self-confidence", "curiosity and motivation to go beyond one's comfort zone", "general cognitive ability", "masculinity and ambition", "self-monitoring" and "the ability to innovate and be creative". The men's and women's groups agreed on the ranking of these factors. "Self-confidence" was the most important individual factor. Third, in the interpersonal category, both groups rejected all the factors, except the women's group accepted "hierarchical superior support".

Overall, "skills", "a good fit between an individual and an organization", "self-confidence" and "hierarchical superior support" are important factors for SC workers to consider when assessing their career advancement prospects.

This study's results have theoretical implications that contribute to the research on SCM and the pedagogy for adapting content taught. It contributes to the theory of career advancement and SCM in three ways. First, this is the first study to use experts' opinions, determined through the Delphi method, to define and validate various factors affecting career advancement in SCM. It enables further studies to investigate how SCM departments can "boost" SCM's attractiveness to new workers (Makarius and Srinivasan, 2017; Zinn *et al.*, 2018; Ruel and Jaegler, 2021). Second, the study proposes a quantifiable approach for evaluating factors influencing career advancement in SCM. This quantification allows for ranking categories of factors and identifying factors that previous research may have understudied. Third, the study effectively demonstrates the application of the proposed integrated Delphi–VAHP approach to evaluate SCM career advancement factors, calculating their relative importance and comparing gender differences in attributing importance to these factors.

In light of the empirical insights gained through the two-phase Delphi–VAHP approach conducted in a French context, this study offers also a set of managerial implications for SCM practitioners of all hierarchical levels. First, by leveraging the Delphi–VAHP approach, SCM managers and HR departments can identify the factors that could contribute to career advancement and, when in managerial positions. Amid the current talent shortage, they could adapt their management and recruitment methods to attract and retain new SCM workers. They can effectively identify talented individuals and propose targeted training courses to enhance their skills. Providing such courses is especially important given managers' responsibility to develop and support young SCM practitioners. Managers can also leverage this study's findings in annual performance assessments or regular coaching sessions.

Second, SC managers can use these factors as criteria for equitable evaluation when assessing and selecting candidates for SCM positions. They can use the proposed approach to determine what factors their colleagues consider important in job candidates and to identify potential solutions for overcoming these factors to accelerate women's and men's career advancement in SCM. This ensures fair and unbiased evaluation processes for both men and women in SCM careers using the same factors. It offers a consistent measure for recruitment,

promoting equal opportunities. Third, with a focus on academic alignment and student empowerment, academics can use the study's results to adapt teaching curricula and ensure that students develop around these factors. Three recommendations emerge from our analysis: First, to foster career progression, academic institutions must update syllabi to acquaint students with the latest advancements, innovations and trends in their respective fields and implement pedagogical approaches centered around experiential learning, including role-playing exercises, serious games, edutainment and simulations involving real-world corporate scenarios; second, educators should guide students in choosing employers that match their values and preferences; and third, special attention should be given to assisting female students in building self-confidence, considering the gender-specific challenges they may face in professional contexts.

This study has some limitations. Those limitations present the three main opportunities for future research. One limitation is that this study consulted experts of a single nationality. Querying a nationally homogeneous sample reduces cultural bias, but researchers conducting similar studies could consult experts from other countries to confirm the results or identify cultural differences. Replication studies are crucial because they allow SCM researchers "*to make much stronger claims about the veracity of our theories, facts, and predictions*" (Pagell, 2021). Another limitation is the study's lack of qualitative empirical data (i.e. verbatim quotations) explaining the experts' decisions, especially those that seem to contradict the expectations of the scientific literature (often from the 1990s). Since the experts rejected the importance of all the environmental factors, future research should investigate the reasons for that rejection. Different studies have demonstrated the importance of the environment to workers' career prospects; especially those of women in both SCM (see Table 2) and the HRM field (Tharenou, 1990). A cross-disciplinary study consulting HRM experts would provide useful general insights that could serve as a benchmark for findings in other sectors, especially those related to gender. Finally, this study did not develop a theoretical framework that explains different factors' role in SC workers' career advancement. It identified factors mentioned over the last three decades in the scarce SCM literature on careers and organised them into categories derived from the HRM literature (Kirchmeyer, 1998). Therefore, future research could develop a theoretical framework that explains how different factors affect SC workers' career advancement.

Notes

1. See: https://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx (Access 15 May 2023)
2. See: https://houston.ascm.org/blog/supply-chain-job-growth (Access 23 November 2022)
3. See: https://www.industryweek.com/supply-chain/article/21990819/its-time-to-put-more-women-at-the-top-of-the-supply-chain (Access 17 November 2022)
4. See: https://lpi.worldbank.org/international/scorecard/line/2/C/FRA/2018 (Access 17 November 2022)
5. See: https://houston.ascm.org/blog/supply-chain-job-growth (Access 17 November 2022)

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(The Appendix follows overleaf)

Appendix 1
Round 1

The objective of this study is to determine the factors that impact career advancement in SCM. The factors are organized into four categories. To evaluate each factor, please select (Essential) if you think the factor mentioned is essential in SCM career advancement, otherwise select (Helpful but not essential) or (Not necessary).

You may additionally include variables that you believe are "Essential" but are not included. This questionnaire should take no more than 20 min to complete. We appreciate your willingness to engage in this study and we are committed to keeping your data confidential.

Presentation:	
Gender	
Number of years of experience in supply chain management	
Position/job	
List of factors	The factor mentioned is (Essential or Helpful or Not essential) for career advancement in SCM?
Environmental and structural factors category	
A male managerial hierarchy	The factor mentioned is
Structural discrimination	The factor mentioned is
Homophily (based on an attraction-similarity hypothesis)	The factor mentioned is
Internal labor market	The factor mentioned is
Having started in favorable conditions	The factor mentioned is
Legislation and social regulation	The factor mentioned is
Human capital category	
Education	The factor mentioned is
Skills	The factor mentioned is
The work experience accumulated since the beginning of the career	The factor mentioned is
The number of hours worked per week	The factor mentioned is
A good fit between an individual and an organization	The factor mentioned is
Training and development	The factor mentioned is
Individual factors category	
Age	The factor mentioned is
Self-confidence	The factor mentioned is
Self-monitoring	The factor mentioned is
Masculinity	The factor mentioned is
Femininity	The factor mentioned is
General cognitive ability	The factor mentioned is
Home status	The factor mentioned is
Interpersonal factors category	
Career encouragement and mentoring	The factor mentioned is
Hierarchical superior support	The factor mentioned is
Informal social and formal networks	The factor mentioned is
Educational encouragement	The factor mentioned is
Additional factors:	
If you have any other ideas for "Essential" factors that are not mentioned in the previous list, we would appreciate it if you would agree to add them with the definition and related category	

Table A1.
First round survey

Appendix 2

Round 2

First, thank you for responding to the first round of this study, which aims to determine the factors that impact career development in SCM.

Following the first round of this study, participants added additional factors that they thought were "Essential" but were not mentioned in the basic list. We have summarized these suggestions. Please answer if you agree or disagree. This questionnaire should not take more than 5 min to complete. It will be followed, in a few weeks, by a third round. We are grateful for your willingness to engage in this study and we are committed to keeping your data private.

Presentation:	
Gender	
Number of years of experience in supply chain management	
Position/job	
List of additional factors	The factor mentioned is (Essential or Helpful or Not essential) for career advancement in SCM?
Mastering one or two foreign languages	The factor mentioned is
Geographic mobility	The factor mentioned is
Being well-dressed and presented	The factor mentioned is
Adequate compensation for the work	The factor mentioned is
Curiosity and motivation to get out of your comfort zone	The factor mentioned is
Ability to innovate and be creative	The factor mentioned is
The framework	The factor mentioned is
The available resources	The factor mentioned is
The recognition of peers	The factor mentioned is

Table A2.
Second round survey

Appendix 3

Round 3

Firstly, we would like to thank you for participating in the first and second rounds of this study, which attempts to identify the factors influencing career advancement in SCM.

Following the analysis of the second round of this study, here are the factors retained. The factors are organized into categories. We would appreciate it if you could provide a ranking from 1 to "n" for each of the factors in each category (1 being the most essential). Please rank the relevance of each category from 1 to n as well. This questionnaire should not take more than 10 min to complete, and this is the final round; thank you again. We are delighted that you have agreed. We appreciate your willingness to engage in this study and we are committed to keeping your data confidential.

Table A3.
Third round survey

Presentation:					
Gender					
Number of years of experience in supply chain management					
Position/job					
Human capital category					
Skills	A good fit between an individual and an organization			Mastering one or two foreign languages	
Individual factors category					
Self-confidence	Self-monitoring	Masculinity and ambition	General cognitive ability	Curiosity and motivation to get out of your comfort zone	Ability to innovate and be creative
Interpersonal factors category					
Hierarchical superior support 1st					
List of categories					
Human capital category		Individual factors category		Interpersonal factors category	

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