Int. J. Production Economics 246 (2022) 108420

Contents lists available at ScienceDirect

International Journal of Production Economics

journal homepage: www.elsevier.com/locate/ijpe

Understanding gender differences in logistics innovation: A complexity theory perspective

David Gligor [a], Ivan Russo [b,*], Michael J. Maloni [c]

[a] University of North Texas, 1155 Union Circle, Denton, TX, 76203, USA
[b] University of Verona, Department of Business Administration, Verona, Italy
[c] Kennesaw State University, 1000 Chastain Road, Kennesaw, GA, 30133, USA

ARTICLE INFO

Keywords:
Logistics innovation
Gender differences
Qualitative comparative analysis (QCA)
Complexity theory

ABSTRACT

Innovation is now more critical for logistics than ever as the industry faces rapidly developing challenges with omnichannel distribution and the coronavirus pandemic. Extant studies of the drivers of logistics innovation have focused on firm-level attributes, largely neglecting micro-level attributes associated with individual logistics professionals engaged in the innovation process as well as the environments in which they work. This includes gender differences, which have been established as critical in both the innovation and logistics literature bases. Consequently, we draw on organizational management research and complexity theory to evaluate gender-specific combinations of logistics innovation antecedents, including individual-level attributes such as self-efficacy, willingness to change, and creativity, as well as job-level attributes such as job satisfaction, training, and job complexity. Although structural equation modeling reveals extremely limited insight into these antecedents, including gender differences, qualitative comparative analysis (QCA) identifies four combinations of attributes for women and seven combinations for men that lead to high levels of logistics innovation. Importantly, the results not only demonstrate that there is no clear single recipe for effective logistics innovation but also corroborate the extant literature indicating that women and men approach innovation differently. Combined, our findings offer important insights into how firms can orchestrate their logistics innovation teams to meet rapidly changing customer needs.

1. Introduction

Driven by several megatrends, including e-commerce and urbanization, logistics innovation has been recognized as an important concept within supply chain management research (Amling and Daugherty, 2018). This need for logistics innovation has recently been exacerbated by the COVID-19 pandemic, dramatically intensifying demand volatility while simultaneously disrupting the flow of essential supplies (Sapino Jeffreys, 2020; Wolf, 2020). For example, Gina Chung, the Vice President of Innovation for DHL Americas, recently highlighted the importance of logistics innovation, noting that "COVID-19 has demonstrated just how critical supply chains are. We see some of these trends like automation, analytics, and real-time visibility. They're accelerating due to COVID and due to the pressures that have been put on global supply chains … there are certain COVID-19 related innovations that might taper off. What will not taper off is how much organizations, especially our customers, have recognized the value of future-proofing their supply chain through technology" (Wolf, 2020).

Broadly, logistics innovation can be described as any logistical service that is valuable or new to a specific audience (Grawe, 2009; Grawe et al., 2014). Supply chain management scholars have explored various aspects of logistics innovation by providing innovation measures (Andersson and Forslund, 2018), examining trends that impact logistics innovation (Amling and Daugherty, 2018), or investigating the process for successful innovation implementation (Björklund and Forslund, 2018). While innovation can be represented in any logistics-related service, from the basic to the complex (Flint et al., 2005), a limitation of the current literature relates to the adopted unit of analysis. In contrast to our study, virtually all existing studies focus on firm-level attributes, largely neglecting micro-level attributes like employees and job design.

This challenge, which is pervasive in the innovation literature, presents a significant limitation, given how the literature has established the critical role of individuals in facilitating organizational innovation

* Corresponding author.
E-mail addresses: david.gligor@unt.edu (D. Gligor), ivan.russo@univr.it (I. Russo), mmaloni@kennesaw.edu (M.J. Maloni).

https://doi.org/10.1016/j.ijpe.2022.108420
Received 17 August 2021; Received in revised form 11 January 2022; Accepted 14 January 2022
Available online 19 January 2022
0925-5273/

(Bogers et al., 2018; Papa et al., 2018; Wei et al., 2020). The need for a micro-level focus is also consistent with the supply chain literature, including Stank et al. (2015), who highlight the theme of "right talent" in the new supply chain agenda. Similarly, Wieland et al. (2016) declare the "people dimension" to be among the most overlooked topics in supply chain research. As such, the current literature provides few insights into the attributes of employees and their jobs that are needed to generate high levels of logistics innovation (Bogers et al., 2018). In response, we consider individual-level attributes such as self-efficacy, willingness to change, and creativity, as well as job-level attributes such as job satisfaction, training, and job complexity.

Gender considerations amplify this research gap. Specifically, understanding the differences between men and women is imperative in the logistics field, given how women are not only underrepresented in the logistics workforce but also typically lack access to the same resources as their male colleagues (McCrea, 2018; Nix and Stiffler, 2018). Although the management literature maintains that men and women require relatively distinct attributes and organizational conditions for innovation (Perrenoud et al., 2020; Wille et al., 2018), supply chain management research is largely silent on gender differences. Thus, shedding light on these differences may have significant managerial implications to guide firms on how to better manage their gender-diverse workforce to drive logistics innovation. Consistent with the above arguments, we aim to expand the literature examining the drivers of logistics innovation with the following research question:

RQ. *What are the differences in the combinations of individual- and job-level attributes between men and women that allow firms to attain high levels of logistics innovation?*

We draw upon the organizational management literature to study this research question by exploring the impact of combinations of individual-level attributes, including self-efficacy, willingness to change, and creativity, as well as job-level attributes, such as job satisfaction, training, and job complexity (i.e., task variety, task feedback, task autonomy, task identity, and task significance). While the theories typically employed in supply chain research such as the resource-based view or the dynamic capabilities perspective offer relevance and value when examining logistics phenomena (Chen et al., 2020), these approaches do not necessarily capture the underlying complexity involved in innovation. Instead, supply chain scholars like Chen et al. (2020, p. 315) specifically point to the need to "look further when identifying appropriate theories" to explain logistics innovation, supporting the application of novel theoretical lenses to enhance innovation research.

Complexity theory offers one such approach. Indeed, logistics employees are human beings, and each possesses individual, unique, and intricate combinations of skills and abilities. Moreover, the expansion of the complexity of the supply chain itself (e.g., technology, globalization) necessitates a better understanding of the requisite individual competencies (Hoberg et al., 2020). The extant literature emphasizes the complexity associated with the process of logistics innovation (Sharma et al., 2020). Accordingly, complexity theory can capture how "relationships between variables can be non-linear, with abrupt switches occurring, so the same 'cause' can, in specific circumstances, produce different effects" (Urry, 2005, p. 4).

Russo et al. (2019, p. 134) explicitly encourage supply chain researchers to apply qualitative comparative analysis (QCA) "when examining complex phenomena". QCA allows researchers to understand how various combinations of antecedents, rather than each antecedent in isolation, can lead to desired outcomes such as effective logistics innovation (Gligor et al., 2020; Russo et al., 2019). In contrast to multiple regression analysis and structural equation modeling, QCA looks at configurations of variables to describe combinations of features that lead to a positive outcome (Pappas and Woodside, 2021). That is, QCA evaluates data as "by case" and not "by variable" (Ragin, 2009). Highlighting this opportunity, we compare partial least squares structural equation modeling (PLS-SEM) with QCA in our analyses below, revealing significant differences in the results.

In this paper, we seek to make several contributions. First, we add to the logistics innovation literature by moving beyond firm-level attributes to address the largely neglected micro-level attributes that contribute to logistics innovation. As such, we provide a novel perspective on the human side of logistics innovation. Second, we further contribute to this literature by exploring gender differences, responding to calls for additional studies to enhance diversity research in supply chain management (Maloni et al., 2019).

Finally, by following the tenets of complexity theory and QCA, we move beyond the "all-or-nothing" approach employed by regression-based methods to study asymmetric relationships between the individual- and job-level attributes, with variables having different effects (e.g., positive, negative, or no relationship at all) within the same data set to lead to high logistics innovation. Specifically, we show that PLS-SEM offers extremely limited insight into the antecedents of logistics innovation. In contrast, QCA offers a rich and in-depth perspective on the "recipes" that firms can employ to achieve logistics innovation. Ultimately, these contributions will inform managers on how to hire, train, and support logistics professionals to maximize the effectiveness of the innovation process.

The rest of the manuscript is organized as follows. First, we discuss complexity theory to guide our theoretical development. Second, we link individual- and job-level attributes to logistics innovation as well as review the literature emphasizing the relevance of gender-related differences in both innovation and logistics. Next, we describe the study methods and compare the PLS-SEM and QCA analyses. Finally, we discuss the paper's findings and their theoretical and managerial contributions, then close by presenting the limitations of our study and opportunities for further research.

2. Literature review

2.1. Logistics innovation

Scholars emphasize the accelerating pace of turbulence and change in supply chains (Christopher and Holweg, 2011; Goldsby and Zinn, 2016). "The mandate for major change in supply chains is as great as ever" (Zinn and Goldsby, 2019, p. 184). As such, an abundance of recent literature has promoted the need for agility and flexibility to react to shifts in both demand and supply (Gligor, 2018; Gligor et al., 2013). However, the literature also urges extending the level of change beyond agility and flexibility to more radical innovation in supply chains to adapt to customers' changing expectations for value and other shifts in the business environment (Dai et al., 2015; Flint et al., 2008). Examples of such innovation drivers in the last two decades include supply chain security, technology (e.g., RFID), and environmental sustainability (Atwater et al., 2010; Dai et al., 2015; Holmqvist and Stefansson, 2006; Melnyk et al., 2013). Additional more recent examples include swings in national attitudes about trade (e.g., Brexit, U.S.–China trade war), new technologies (e.g., blockchain, Internet of Things, artificial intelligence), driverless vehicles, and omnichannel distribution (Goldsby and Zinn, 2016; Klumpp and Zijm, 2019; Zinn and Goldsby, 2019).

Nevertheless, the domain of supply chain, including logistics, is historically slow to change (Acar, 2020; Wagner, 2008; Zinn and Goldsby, 2019). In fact, Christopher and Holweg (2011) maintain that supply chains have been "built on assumption of stability". Fittingly, scholars point to a lack of research in logistics innovation and stress the need for more research to help supply chains manage change (Flint et al., 2005; Greer and Ford, 2009). The limited literature available has identified important organizational capabilities for logistics innovation, such as market orientation, organizational learning and knowledge synthesis, process orientation, and supply chain capital (Acar, 2020; Autry and Griffis, 2008; Flint et al., 2005; Grawe et al., 2011). Yet, the larger body of general innovation literature also stresses human factors, including strong linkages between human capital and innovation capabilities (Østergaard et al., 2011). "Innovation is an interactive process that often involves communication and interaction among employees in a firm and draws on their different qualities" (Østergaard et al., 2011, p. 501).

Consequently, organizations must understand the drivers of successful innovation (Marxt and Link, 2002; O'Brien and Smith, 1995). Most innovation literature focuses on the organization or the product/service and not the employees driving the change (Alsos et al., 2013; Tuominen et al., 1999). Likewise, despite some advances in understanding logistics innovation as well as the role of the supply chain in supporting innovation (Chong and Zhou, 2014; Lii and Kuo, 2016; Wong et al., 2013; Yang et al., 2009), the logistics literature has largely overlooked the "people" side of the innovation process. As exceptions, Omar et al. (2012) emphasize the importance of complex social processes in driving supply chain organizational change. Likewise, Putnik et al. (2019) underscore the prominence of employee engagement in the logistics innovation process. As additional examples, Richey et al. (2005) examine the role of resource commitment in generating logistics innovation, while Tanskanen et al. (2015) explore the generative mechanisms of the adoption of logistics innovation.

Beyond that, the human side of logistics is relatively uncharted. Therefore, logistics innovation research must aim to identify the generative mechanisms of innovation itself (Tanskanen et al., 2015). We seek to fill this gap with the analysis below, by examining specific individual- and job-level attributes that are promoted in the existing innovation research. We also investigate gender differences based on both the gender imbalance in the logistics industry (Hewlett et al., 2013; Zinn et al., 2018) and gender differences espoused in the innovation literature (Alsos et al., 2013; Marlow and McAdam, 2012).

2.2. Linking individual- and job-level attributes to logistics innovation

Extant literature identifies several individual-level and job-level attributes that can impact innovation. This includes individual attributes in self-efficacy, willingness to change, and creativity. For job-level attributes, we consider job satisfaction, training, and job complexity (i.e., task variety, task feedback, task autonomy, task identity, and task significance).

2.2.1. Self-efficacy

Self-efficacy captures the extent to which individuals believe in their abilities to execute actions and tasks that yield desired outcomes (Bandura, 2010). Studies show that "people with the same skills may perform poorly, adequately, or extraordinarily, depending on whether their self-beliefs or efficacy enhance or impair their motivation and problem-solving efforts" (Ahlin et al., 2014, p. 104). As such, self-efficacy has emerged as a relevant construct that can impact individuals' ability to innovate. The organizational behavior literature provides substantial evidence linking self-efficacy to various types of innovation. For example, Ahlin et al. (2014) found that the self-efficacy of entrepreneurs plays a significant role in firm product and process innovation. Similarly, Chen and Zhou (2017) show that entrepreneurial self-efficacy has a direct impact on a firm's innovation behavior. Studies also indicate that, in various contexts, an individual with a high level of self-efficacy is more effective in implementing their creative ideas (Grosser et al., 2017; Hallak et al., 2018). These claims are also substantiated by meta-analytic findings showing that self-efficacy has a significant impact on innovation (Hammond et al., 2011).

2.2.2. Willingness to change

Although willingness to change has received scant attention in supply chain research, the concept has been investigated in a variety of domains such as organizational behavior, marketing, and psychology. Change is at the very core of innovation (Montalvo, 2006). In fact, Hurt et al. (1977) define innovativeness as an individual's willingness to change. Accordingly, willingness to change has been linked to innovation in various contexts for both individuals and firms (Dayan et al., 2016; Moreira et al., 2016; Zeid et al., 2017). For example, Wang and Ahmed (2004) found that managers' innovativeness is dependent on their willingness to change. McGuirk et al. (2015) also empirically confirm that small firms are more likely to innovate when employing managers who are willing to change.

2.2.3. Creativity

Employee creativity has been considered an important source of competitive advantage and an integral component of organizational success (Ouakouak and Ouedraogo, 2017; Shalley and Gilson, 2004). Described as the development of ideas about services, products, practices, or procedures that are original and possibly beneficial to a firm (Oldham and Cummings, 1996), employee creativity allows firms to remain flexible (Gilson et al., 2005). Studies have found empirical evidence pointing to employee creativity as an important driver of firm innovation (Liu et al., 2017). In fact, "employee creativity is considered one of the prerequisites of firm innovation" (Hon and Lui, 2016,p. 862). Despite the relevance of this important human characteristic, the logistics literature has mostly overlooked creativity, though a few studies link employee creativity to logistics service differentiation (Ellinger et al., 2002; Jeng, 2018; Ralston et al., 2013). Interestingly, creativity has also been tied to supply chain resilience, helping firms better deal with supply chain disruptions (Ambulkar et al., 2016; Pettit et al., 2010). Thus, a logistics firm characterized by creative employees will apply new, useful ideas to introduce innovative solutions that match customer needs (Ralston et al., 2013).

2.2.4. Job satisfaction

Shifting to job-level attributes, the concept of job satisfaction refers to one's sense of fulfillment with one's job (e.g., physical working conditions, hours of work, and earnings) (McGuirk et al., 2015). In other words, job satisfaction manifests as an individual's positive or negative feeling toward his/her job. Job satisfaction has been investigated extensively in the context of organizational behavior and has been linked to several desirable outcomes, including various aspects of innovation (Prasetio et al., 2017). For example, Tsai and Yen (2020) found that job satisfaction has a direct impact on an employee's commitment to innovation. Further, Akdol and Arikboga (2015) indicate that job satisfaction is a key prerequisite for the development of an innovative work environment. In their study of organizational innovation, Shipton et al. (2006) conclude that employees who are satisfied with their jobs are more likely to support, rather than resist, innovation-related initiatives. As another example, Trivellas and Santouridis (2009) reveal that job satisfaction plays a key role in the relationship between quality management practices and innovation. Additionally, McGuirk et al. (2015) indicate that small firms that employ managers who are satisfied with their jobs tend to innovate more. Similar findings were reported by Lambert and Hogan (2010).

2.2.5. Training

Job training, both formal and informal, is considered to be an important requirement for developing competent managers, spurring innovation across a variety of contexts (Derwik et al., 2016; Mincer, 1962). In his study of Australian firms, Rogers (2004) found job training had a significant positive impact on innovation for small manufacturing firms, with these findings later confirmed by McGuirk et al. (2015). González et al. (2016) found that R&D expenditures are more effective in spurring innovation when firms also invest resources in worker training. Furthermore, job training for some smaller firms can boost innovation even in the absence of investments in R&D. Børing (2017) also found that job training leads to an increase in firms' innovation activities, while Na (2021) contributes to the generalizability of the positive relationship between job training and innovation. Specific to the supply chain, Mohanty and Prakash (2014) reveal that job training enhances employees' capacity to implement innovative supply chain environmental initiatives.

2.2.6. Job complexity

Finally, we consider the role of job complexity. The same job can be more or less complex across organizations depending on specific choices in job design (Morgeson and Humphrey, 2006). For example, organizational behavior research shows that employee behaviors and performance can be influenced by job complexity (Oldham et al., 1986; Zacher et al., 2010). This stream of research suggests that when jobs are complex, individuals are more inclined to give their full attention to tasks and are more likely to deploy significant effort to consider different alternatives, solve problems, and innovate (Shalley and Gilson, 2004; Yuan and Woodman, 2010). Multiple studies report empirical evidence that job complexity has a direct and positive impact on innovation (Alameri et al., 2019; Audenaert et al., 2017; Shalley et al., 2009). This is corroborated by Hammond et al.'s (2011) meta-analysis, which finds that job complexity facilitates individual innovation. This is particularly impactful for logistics, given that logistics tasks are complex and multifaceted (Holcomb et al., 2014), with Jeng (2018, p. 387) highlighting "the distinctive nature of logistics services (high complexity, high task variability, high task uncertainty of business-to-business services)." Consistent with Jeng (2018), we consider the five aspects of job complexity in autonomy, skill variety, task identity, task feedback, and task significance.

2.3. Gender differences

To enhance this study beyond the above individual- and job-level attributes, we also consider gender differences. Gender researchers argue that the behavior of men and women is influenced differently by various internal and external attributes (Amanatullah and Morris, 2010; Rudman and Phelan, 2008). Specific to innovation, multiple organizational behavior studies show differences in the individual- and job-level attributes that lead men and women to innovate. For instance, Pons et al. (2016) found that innovation is more correlated with intrinsic variables (e.g., self-confidence) for women than for men. They also reveal that higher job demands facilitate the generation of innovative ideas among men while being detrimental to innovation among women. On the other hand, men are more responsive than women to technological innovations that have a strong utilitarian and informational aspect. Kabasheva et al. (2015) also emphasize the importance of considering gender when evaluating the attributes that impact employees' innovative behavior, concluding that women typically develop a more favorable innovation perception than men. Abukhait et al. (2019) also show significant gender differences when examining the impact of knowledge sharing and empowerment on innovative behavior. More recently, Zuraik et al. (2020) found that female innovation team leaders are less likely than males to engage in risk-taking, exploration, and ideation, leading to the conclusion that male team leaders are perceived as more effective in leading innovation.

As a compounding challenge, the literature also reveals an underlying gender bias in the innovation process (Blake and Hanson, 2005; Marlow and McAdam, 2012). Innovation is typically associated with fields that are perceived as male-dominated (e.g., technology, manufacturing) (Kvidal and Ljunggren, 2014). Moreover, scholars maintain that women frequently not only lack collegial support but also find that their inputs are stifled during the innovation process (Alsos et al., 2013; Foss et al., 2013; Poutanen and Kovalainen, 2013). In contrast, other research reveals how gender diversity can improve innovation outcomes (Horbach and Jacob, 2018; Østergaard et al., 2011; Parrotta et al., 2014). This literature urges significantly more research on gender influences in the innovation process, as men and women approach innovation differently (Alsos et al., 2013; Foss et al., 2013).

2.3.1. Gender and logistics

Gender is particularly relevant to logistics given the underlying gender bias in the field (Nix and Stiffler, 2018). Despite progress in recent decades, women are still underrepresented in logistics (Zinn et al., 2018) and also perceive inequities in pay, advancement, and professional networking (Keller and Ozment, 2009; O'Marah, 2016). Although several studies highlight gender as a significant moderator when assessing logistics phenomena (Eroglu and Knemeyer, 2010; Jermsittiparsert and Srihirun, 2019; Larson, 2019; Park and Krishnan, 2005), gender issues have been under-researched in the logistics literature (Hull, 2016; Putnik et al., 2019). Thus, substantial empirical evidence suggests, but has not confirmed, that diversity is needed to support logistics innovation, allowing our study to not only enhance logistics innovation effectiveness but also enable a more supportive and attractive work environment for women in the field (Hull, 2016; Maloni et al., 2019; Putnik et al., 2019).

3. Theory development

3.1. Complexity theory

Complexity theory is effective in explaining important features of emergent social phenomena; notably, how changes do not happen incrementally in a linear fashion, but as discontinuities marked by qualitative transformations (Byrne and Callaghan, 2013; Sawhney and Prandelli, 2000). As highlighted above, many significant individual- and job-level attributes, including gender, can potentially influence innovation. Given this complexity, we approach the analysis herein from the standpoint of complexity theory in comparison to the often-used relational modeling, such as regression. Specifically, complexity theory argues that in reality, some relationships between variables can be too complex to be accurately captured by linear analyses (Ordanini et al., 2014; Woodside, 2014). For instance, there could simultaneously be cases in the same dataset where X has a negative impact on Y, where X has a positive impact on Y, or where X does not share a significant relationship with Y (i.e., contrarian cases) (Russo et al., 2019). This can create "unexpected structures and events whose properties can be different from the underlying elementary laws" (Urry, 2005, p. 5). Meuer and Fiss (2020) suggest that no single variable is likely to be sufficient or necessary when analyzing an "insufficient but non-redundant part of a condition which is itself unnecessary but sufficient" (INUS conditions) (Mackie, 1974). For example, in our study, high self-efficacy may be positively related to logistics innovation for some employees but not for others. This is consistent with complexity theory, as "different antecedents in a combination can negatively or positively impact the outcome variable depending on the absence or presence of other elements in the combination" (Gligor and Bozkurt, 2020, p. 4).

QCA offers an effective methodology to provide explanations consistent with the tenets of complexity theory and uncover what circumstances (i.e., combinations of attributes) could lead to the same outcome variable (i.e., logistics innovation). In contrast, simply seeking to identify if an overall effect for a variable exists in a dataset (i.e., whether the proposed relationship is supported at a specific p-value) may result in essentially ignoring cases that do not exhibit the overall effect. Instead, QCA allows scholars to uncover all the possible combinations of attributes (e.g., self-efficacy, willingness to change, creativity, job satisfaction, training, job complexity), whether high or low, that lead to the same outcome (e.g., high logistics innovation) (Fiss, 2011). This equifinality approach allows scholars to better capture the complexity of real-life phenomena and offer richer explanations regarding the relationships between the variables of interest (Gligor et al., 2020). As such, QCA is useful for both inductive and deductive reasoning for theory building, elaboration, and testing (Park et al., 2020). This study will explore all the possible configurations that explain logistics innovation, based on identified literature review gaps. In other words, this method can help us discover previously unknown configurations (Misangyi et al., 2017). Innovation in the context of supply chains has been considered a complex phenomenon that could benefit from the application of QCA (Russo et al., 2019). The analyses below highlight this by contrasting QCA to the all-or-nothing approach of PLS-SEM on the same survey dataset. Because QCA allows for the combination of causal conditions from different levels—in our case micro-level attributes associated with logisticians—it is well suited to explore if, and how, elements from different levels can be configured to shape outcomes of interest. Therefore, we propose to explore diversity for effective logistics innovation by women and men:

Research Proposition: *Men and women require distinct combinations of individual- and job-level attributes for their employer firms to achieve superior logistics innovation.*

4. Methods

4.1. Survey instrument

The survey constructs (Table 1) were taken directly from the existing literature. Participants were asked to indicate their individual-level attributes, including self-efficacy (Luthans et al., 2007), willingness to change (McGuirk et al., 2015), and creativity (Jeng, 2018) as well as their job-level attributes, including job satisfaction (adapted from McGuirk et al. (2015)), training (McGuirk et al., 2015), and job complexity (Hackman et al., 1980; Jeng, 2018). The job complexity construct was derived from the Job Diagnostic Survey (Hackman et al., 1980) and, in line with Jeng (2018), assesses five characteristics: autonomy, skill variety, task identity, task feedback, and task significance, which were averaged to form a summary index. Next, the participants evaluated their organization's level of logistics innovation (Grawe et al., 2015). All items were measured with a Likert scale (1 = strongly disagree to 7 = strongly agree), except for training, which was evaluated with a binary question.

The questionnaire was pretested with a pilot sample of 30 logistics experts to ensure that the questions were understandable and unambiguous. Their feedback resulted in refining the sequence and structure of the survey, rather than the content and wording. For example, some questions better captured the level of logistics experience, which participants preferred to be positioned at the end of the survey.

4.2. Survey response

We obtained the survey distribution list of active logistics practitioners from two sources: 1) a university in Italy with a master's program in logistics and supply chain management, and 2) a training institute in logistics and transportation in the same province in Italy. Both are well-known programs for managers in logistics and supply chain management. The combined sample of former students from these two programs consisted of 320 graduates since 2002. Of the 320 potential participants, 39 were not contactable due to inaccurate email addresses.

We distributed the survey to these 281 working logistics professionals by email, with 160 useable responses (57% response). About half were from the university list and the other half from the institute list. Two population tests of these respondent groups indicate no statistically significant differences, allowing us to combine the two samples for the final data set. Table 2a (women) and 2b (men) offer a summary of the descriptive statistics, with 53 completed surveys for women (mean age of 32) and 107 for men (mean age of 33). The level of professional work experience is significant, with 77% of men and 72% of women exceeding 15 years. The respondents represent various industry sectors such as third-party logistics (19%), manufacturing (30%), retailing (12%), and services (39%), suggesting that the sample is well-balanced, representing the breadth of logistics practice in industry.

We investigated possible non-response bias by comparing responses collected during the first wave of distribution to those collected in later rounds. No statistical differences across the constructs were found between these two groups. In addition, we contacted a random sample of 15 non-respondents and asked five non-demographic related questions.

Table 1
Measures.

Attribute (source)	Items	Cronbach alpha
Individual level attributes		
Self-efficacy[a] Luthans et al. (2007)	1. I feel confident analyzing a long-term problem to find a solution. 2. I feel confident in representing my work in meetings with management. 3. I feel confident contributing to discussions about the company's strategy. 4. I feel confident helping to set targets/goals in my work area. 5. I feel confident contacting people outside the company (e.g., suppliers, customers) to discuss problems. 6. I feel confident presenting information to a group of colleagues.	0.91
Willingness to change[a] McGuirk et al. (2015)	1. Increase in the level of technology or computers involved in your work. 2. Increase in the level of skills necessary to carry out your job. 3. Increased responsibility for improving how your work is done.	0.88
Creativity[a] Jeng (2018)	1. I try to be as creative as I can in my job. 2. I experiment with new approaches in performing my job. 3. On the job, I am inventive in overcoming barriers.	0.88
Job level attributes		
Job satisfaction[a] McGuirk et al. (2015)	1. In general, I am satisfied with my present job. 2. I am satisfied with my hours of work. 3. I am satisfied with my earnings from my current job.	0.75
Training[b]	1. Have you received any education or training paid for or provided by your present employer over the last 2 years?	n/a
Job complexity[a] Jeng (2018)	**Task Variety** 1. This job gives me the opportunity to do many different things. 2. I perform different tasks during a typical workday. 3. This job requires me to use a number of skills and talents. **Task Feedback** 1. I can easily as certain whether I am performing well or poorly in this job. 2. I easily identify how well I am doing in the job on which I am working. 3. I have many opportunities to find out how well I am doing in my job. **Task Autonomy** 1. I have many opportunities for independent thought and actions in my job. 2. I have many opportunities to take initiative in this job. 3. I am encouraged to find solutions to problems. 4. I have a great deal of control over the pace of my work. **Task Identity** 1. Have many opportunities to complete the work I started. 2. In this job, I can see the entire piece of work. 3. I have many opportunities to do a job from beginning to end (i.e., the chance to do a whole job). **Task Significance** 1. My work significantly affects the lives and well-being of other people. 2. Many other people can be affected by how well the work is done.	0.88
		0.94

(*continued on next page*)

Table 1 (*continued*)

Attribute (source)	Items	Cronbach alpha
Logistics innovation[a] Grawe et al. (2015)	1. We are developing new processes within the logistics operation at my host firm. 2. We are developing new services within the logistics operation at my host firm. 3. We seek out new ways to do things in the logistics operation at my host firm. 4. The logistics operation has been changed to meet new business needs at my host firm. 5. We have identified opportunities to expand processes to new applications at my host firm.	

[a] 1 – strongly disagree to 7 – strongly agree.
[b] 0 – no, 1 - yes.

Table 2a
Descriptive statistics (women).

Variables	N	Min	Max	Mean	Std. Dev.
Self Efficacy	53	2.17	7.00	5.39	1.08
Willingness to change	53	2.00	7.00	5.93	1.34
Creativity	53	2.33	7.00	5.07	1.00
Job satisfaction	53	1.33	7.00	4.84	1.46
Job complexity	53	3.07	7.00	5.04	0.77
Logistics innovation	53	1.00	7.00	4.79	1.39

Table 2b
Descriptive statistics (men).

Variables	N	Min	Max	Mean	StDev
Self Efficacy	107	1.00	7.00	5.45	1.10
Willingness to change	107	1.00	7.00	5.92	1.51
Creativity	107	1.00	7.00	5.29	1.27
Job satisfaction	107	1.00	7.00	4.86	1.29
Job complexity	107	2.60	7.00	5.18	1.02
Logistics innovation	107	1.00	7.00	4.96	1.62

Again, no statistical differences were found between these two groups. We followed the conventions suggested by Podsakoff et al. (2003) in order to reduce common method biases during the design and execution of this research. For example, respondents were reassured that their answers would be collected anonymously and that there were no right or wrong answers. In addition, survey items were randomized for all respondents.

4.3. Measure reliability and validity

Based on the results from a confirmatory factor analysis (CFA), reliability and validity are satisfactory for all scales. First, the CFA supports reliability, with Cronbach alpha and composite reliabilities exceeding 0.70. For convergent validity, all factor loadings exceed the recommended 0.60 threshold, and the average variance extracted values are greater than the recommended 0.50 threshold (Bagozzi and Yi, 1988; Fornell and Larcker, 1981). Discriminant validity is verified with all heterotrait-monotrait (HTMT) values falling below 0.85 (Kock, 2015). Finally, the variance inflation factor values of all lower-order constructs fall within 0.20 and 5.00, hence minimizing concerns about collinearity.

4.4. PLS-SEM

We next applied PLS-SEM to evaluate the general direct effects of self-efficacy, willingness to change, creativity, job satisfaction, training, and job complexity on logistics innovation. PLS-SEM is a reasonable approach, given the focus of the research on the prediction of logistics innovation versus confirming existing theory (Hair et al., 2011; Jöreskog and Wold, 1982). Second, PLS-SEM supports job complexity as a formative construct of task variety, task feedback, task autonomy, task identity, and task significance (Hair et al., 2019). Furthermore, many of the indicators demonstrated non-normal distributions through significant skewness and kurtosis (Hair et al., 2019). Finally, PLS-SEM enables the use of the smaller sample sizes in the gender-specific datasets (Hair et al., 2011).

We evaluated the structural model with bootstrapping ($n = 5000$) with the results presented in Fig. 1 for women and Fig. 2 for men. For women, the overall predictive accuracy ($r^2 = 0.35$) is weak to moderate, and the predictive relevance ($Q^2 = 0.25$) is medium. However, the only significant antecedent to logistics innovation is job satisfaction ($B = 0.46$, $p = 0.01$) with a medium effect size ($f^2 = 0.22$). All other antecedents are not significant. The structural model is even weaker for men ($r^2 = 0.17$, $Q^2 = 0.13$). The only significant variable is training ($B = 0.24$, $p = 0.01$), which retains a relatively weak effect size ($f^2 = 0.06$).

We next applied multi-group analysis to further assess gender differences in greater detail (Sarstedt et al., 2011). Table 3 shows no statistically significant differences in the structural model paths by gender, with none of the p-values for the path differences between men and women falling below 0.05 or above 0.95. In other words, despite some differences in the structural model paths for women and men identified above, the models are statistically similar for both genders. Thus, PLS-SEM provides minimal insight into the drivers of logistics innovation, including potential differences by gender.

4.5. QCA

The lack of compelling results from PLS-SEM is not necessarily unexpected, given how scholars highlight the complexity associated with logistics innovation (Chen et al., 2020; Sharma et al., 2020). In other words, the all-or-nothing approach of PLS-SEM requires all variables to have consistent effects across all respondents. Instead, complexity theory supports the idea of potentially inconsistent antecedents of logistics innovation, with scholars pointing to QCA as an appropriate tool for evaluating such complexity (Russo et al., 2019). QCA enables a more detailed, richer assessment of different "recipes" that can lead to logistics innovation (Pappas and Woodside, 2021).

We thus adopt the fuzzy-set QCA (fs/QCA) approach to best capture the complexity of the innovation phenomena, including the interaction between the individual-level attributes of the respondents and their job-level attributes that yield high levels of logistics innovation. In detail, fsQCA explicitly examines connections between a high level of logistics innovation and all possible configurations of binary states (i.e., presence or absence) of its conditions (i.e., self-efficacy, willingness to change, creativity, job satisfaction, training, and job complexity), dividing the sample between men and women. The goal is to identify the necessary conditions and sufficient combinations of conditions for high levels of logistics innovation, subsequently called configurations or recipes. The application of QCA involves four sequential tasks (Fiss, 2011; Ordanini et al., 2014): 1) defining the property space, 2) developing set membership measures, 3) evaluating the consistency in set relations, and 4) logical reduction. We rigorously followed the fs/QCA guidelines applied in the logistics and supply chain management literature (Gligor et al., 2020; Kosmol et al., 2018; Russo et al., 2019; Timmer and Kaufmann, 2017).

4.5.1. QCA steps

As the first step of the QCA procedure, defining the property space generates all possible configurations of attributes of high logistics innovation identified from the extant literature, as discussed in the literature review. The property space is composed of all combinations of the binary states of the presence or absence of the influence attributes (self-efficacy, willingness to change, creativity, job satisfaction, training, and job complexity) that impact a high level of logistics innovation. With the conditions, the property space subsequently has 64 (i.e., 2^6)

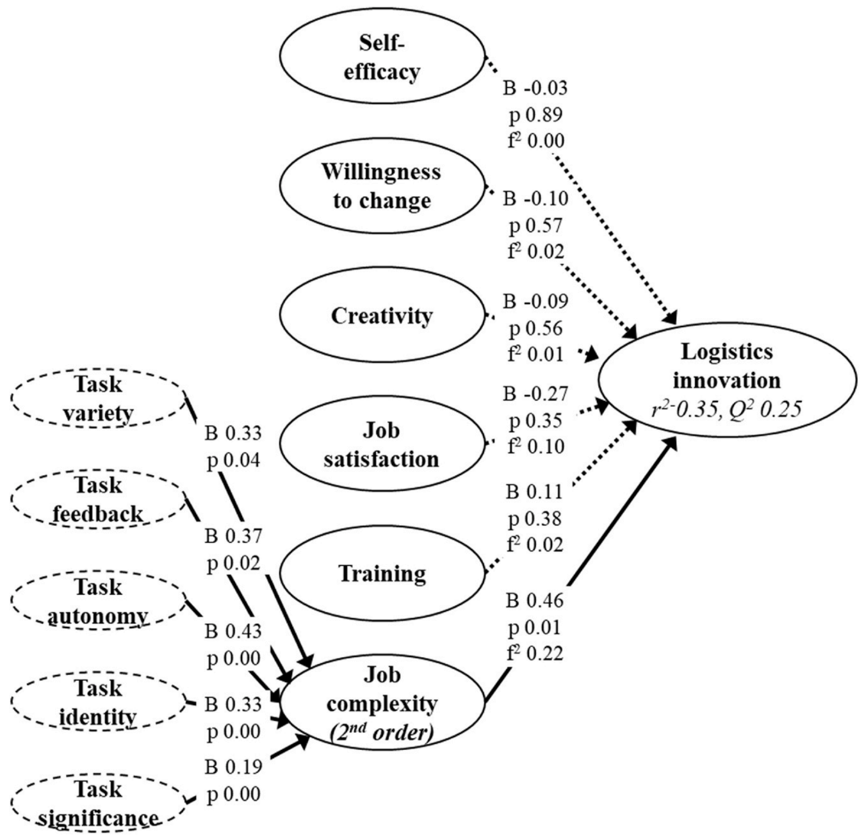

Fig. 1. Structural equation modeling - Women.

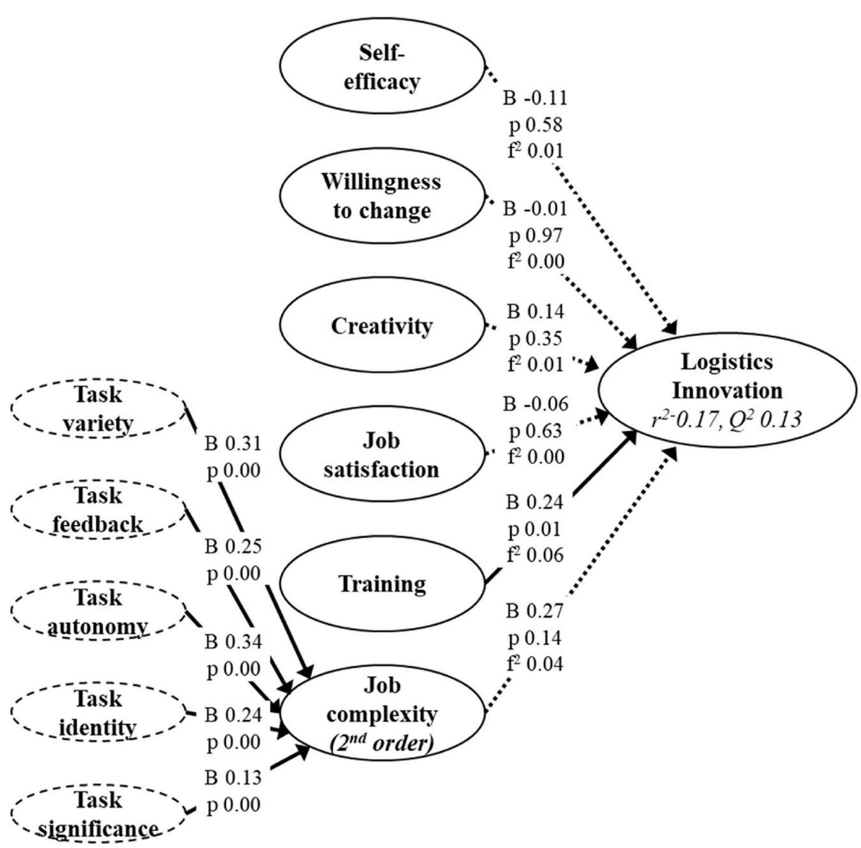

Fig. 2. Structural equation modeling – Men.

Table 3
PLS-SEM multi-group analysis.

Path		Women			Men			Difference	
		B	p	f^2	B	p	f^2	B	p
Self-efficacy	Logistics innovation	−0.03	0.89	0.00	−0.11	0.58	0.01	0.08	0.40
Willingness to change	Logistics innovation	−0.10	0.57	0.02	−0.01	0.97	0.00	−0.10	0.68
Creativity	Logistics innovation	−0.09	0.56	0.01	0.14	0.35	0.01	−0.23	0.86
Job satisfaction	Logistics innovation	−0.27	0.35	0.10	−0.06	0.63	0.00	−0.22	0.76
Training	Logistics innovation	0.11	0.38	0.02	0.24	0.01	0.06	−0.13	0.80
Job complexity	Logistics innovation	0.46	0.01	0.22	0.27	0.14	0.04	0.19	0.21

different combinations.

The second fs/QCA step requires the calibration of all involved variables into sets to capture fine-grained differences in the degrees of membership. In our case, the training level is a dichotomous variable. However, we specify membership and the relative calibration in the range 0–1 for the remaining Likert scale variables. Such an approach allows for partial memberships with the calibration, thereby making the data sets “fuzzy” and enriching the detail of information (Rihoux and Ragin, 2008). Specifically, the endpoints of the 7-point Likert scales serve as the two qualitative anchors for calibration of full membership (7) and full non-membership (1). The crossover point is calculated by observing the distribution and median scores for each attribute except for the dichotomous training level where, consistent with Greckhamer et al. (2018) and Gligor et al. (2019), a score of full membership for training level is attributed with “yes” and a score of full non-membership with “no.” Extant literature suggests the median as the crossover point for the other variables. Accordingly, the QCA findings must be tested for robustness, which is evident if slightly different calibration decisions lead to similar findings (Schneider and Wagemann, 2012); i.e., the identified paths do not lead to different interpretations (Greckhamer et al., 2018). Table 4 summarizes the rules of calibration for this analysis, as suggested by recent studies (Scarpi et al., 2021).

In the third QCA step, we set the cases that lead to a high level of logistics innovation with a value of “1.” In line with well-established criteria for evaluating fs/QCA, we applied three criteria (frequency, consistency, and coverage) in evaluating the resulting configurations of attributes (Ragin, 2008). First, we chose a frequency threshold of two observations to exclude less important configurations. Next, we assessed consistency of whether the causal pathway produces the dependent variable, establishing a consistency threshold of 0.75 (Fiss, 2011; Ordanini et al., 2014). The overall consistency for the configurations was 0.80 for women and 0.77 for men, indicating good predictive validity for both models.

Finally, we computed the coverage measure for each sufficient configuration, ensuring each exceeds 0.10 (Woodside et al., 2018). Raw coverage expresses how much a single configuration achieves, and unique coverage indicates how much it covers on its own. This study adopts the intermediate solution (both core and peripheral conditions), following current conventions in other studies (Gligor et al., 2020; Russo et al., 2019). The coverage values were 0.57 for women and 0.77 for men. Tables 5 and 6 present each configuration for women and men, respectively with black circles (●) indicating the presence of a condition and circles with a cross (⊗) indicating its absence. The results support the presence of multiple equifinal configurations and reflect the complexity of the innovation phenomenon under investigation.

5. Results

The above investigation uncovers the limitations of PLS-SEM, with QCA detecting various gender-specific combinations of attributes that facilitate logistics innovation.

Examining the findings from the fsQCA and from the PLS-SEM allows us to make several observations, highlighting how we are able to obtain deeper insights into the data by employing fsQCA. A summary and comparison of the PLS-SEM and QCA findings can be found in Table 7.

In detail, we identified four combinations for women and seven combinations for men. For women, Solution 1 informs us that firms are highly innovative when women have high self-efficacy and creativity,

Table 5
Configurations for logistics innovation - Women.

Construct	1	2	3	4
Self-efficacy	●		⊗	⊗
Willingness to change		⊗	⊗	
Creativity	●	●	⊗	⊗
Job satisfaction	●	●	⊗	⊗
Training	●	●	⊗	⊗
Job complexity	●	●		⊗
Raw coverage	*0.39*	*0.28*	*0.21*	*0.25*
Unique coverage	*0.11*	*0.01*	*0.02*	*0.05*
Consistency	*0.91*	*0.91*	*0.80*	*0.75*

● = Core causal condition present; ⊗ = Core causal condition absent.
Solution coverage: 0.57.
Solution consistency: 0.80.

Table 4
Fuzzy-set calibration rules.

Construct	Original scale	Full non-membership	Full membership	Cross-over (women)	Cross-over (men)
Self-efficacy	7-point Likert scale	1	7	5.67	5.67
Willingness to change	7-point Likert scale	1	7	6.33	6.33
Creativity	7-point Likert scale	1	7	5.00	5.33
Job satisfaction	7-point Likert scale	1	7	5.33	5.00
Training	Dichotomous 0 = low 1 = high	0	1		
Job complexity	7-point Likert scale	1	7	5.13	5.27
Logistics innovation	7-point Likert scale	1	7	5.00	5.25

Table 6
Configurations for logistics innovation - Men.

Construct	1	2	3	4	5	6	7
Self-efficacy	●		●	●	●	⊗	⊗
Willingness to change	●	⊗	●	●	⊗		
Creativity	●	●	●	●	●	⊗	⊗
Job satisfaction	●	●		⊗	⊗		⊗
Training		●	●	⊗	⊗	●	
Job complexity	●	●	●	⊗	●	⊗	⊗
Raw coverage	*0.55*	*0.24*	*0.43*	*0.19*	*0.19*	*0.32*	*0.39*
Unique coverage	*0.07*	*0.01*	*0.03*	*0.01*	*0.03*	*0.02*	*0.03*
Consistency	*0.88*	*0.93*	*0.91*	*0.76*	*0.88*	*0.83*	*0.81*

● = Core causal condition present; ⊗ = Core causal condition absent.
Solution coverage: 0.77.
Solution consistency: 0.77.

and experience high levels of job satisfaction, training, and job complexity. Willingness to change is not significant under these conditions. Solution 2 shows that firms can experience high levels of innovation when women exhibit low willingness to change but high creativity, while experiencing high levels of job satisfaction, training, and job complexity. Under these conditions, self-efficacy is unimportant. In contrast to Solutions 1 and 2, Solution 3 unexpectedly reveals that firms can show high levels of innovation when women exhibit low levels of self-efficacy, willingness to change, and creativity, and experience low job satisfaction and low training. Job complexity is not significant under conditions. Similarly, Solution 4 indicates that firms can experience high logistics innovation when women exhibit low self-efficacy and creativity, and experience low levels of job satisfaction, training, and job complexity.

The following seven solutions emerge for men. Solution 1 shows that firms can experience high logistics innovation when men exhibit high levels of self-efficacy, willingness to change, and creativity, while also encountering high levels of job satisfaction and job complexity. Under these conditions training is not important. Solution 2 suggests that firms can experience high logistics innovation when men exhibit low willingness to change and high creativity while encountering high levels of job satisfaction, training, and job complexity. Self-efficacy is unimportant under these conditions. Solution 3 shows that firms can experience high logistics innovation when men exhibit high levels of self-efficacy, willingness to change, and creativity while encountering high levels of training and job complexity. In this context, job satisfaction is not significant. Solution 4 reveals that firms can experience high logistics innovation when men exhibit high levels of self-efficacy, willingness to change, and high creativity, despite encountering low levels of job satisfaction, training, and job complexity. In other words, job-level characteristics are not significant under this configuration. Solution 5 exhibits a mix of individual-level attributes and job-level characteristics, informing us that firms can experience high logistics innovation when men exhibit high self-efficacy, low willingness to change, and high creativity, while encountering low job satisfaction, low training, and high job complexity. Similar to Solutions 3 and 4 for women, Solution 6 indicates that firms can experience high logistics innovation when men exhibit low self-efficacy and low creativity, while encountering high levels of training and low job complexity. Job satisfaction and willingness to change are unimportant under these conditions. Similarly, Solution 7 informs us that firms can experience high logistics innovation when men exhibit low levels of self-efficacy and creativity while encountering low levels of job satisfaction and job complexity. Willingness to change and training are insignificant in this context.

6. Discussion

Logistics innovation is more important than ever to organizational success. The literature has historically studied logistics innovation processes (Björklund and Forslund, 2018; Flint et al., 2005) and measurement (Andersson and Forslund, 2018). Additionally, scholars highlight the factors contributing to successful logistics innovation at both country (e.g., connectivity, labor, and government) (Amling and Daugherty, 2018) and organizational (e.g., resources, technology, and resource sharing) levels (Grawe et al., 2014; Klumpp and Zijm, 2019; Tanskanen et al., 2015; Yang et al., 2009). However, few studies examine employee and work environmental factors, including gender influences (Putnik et al., 2019). Moreover, the application of traditional all-or-nothing analytical methods with logistics innovation can lead to weak or confusing results (Putnik et al., 2019; Richey et al., 2005). Our PLS-SEM results provide further evidence of this.

In contrast, our QCA outcomes offer rich evidence of gender-specific combinations of attributes that lead to high levels of logistics innovation. As such, there is no clear single recipe for effective logistics innovation, and women and men approach innovation differently. These results concur with other studies that employ QCA to evaluate organizational-level drivers of innovation in other industries. As examples, Reichert et al. (2016) establish two recipes for low-tech firm innovation, and Ordanini et al. (2014) identify three recipes for innovation at luxury hotels.

6.1. Theoretical contributions and implications

Our results offer several contributions to the literature. First, we augment the scarce research on the drivers of logistics innovation. Extant studies examining the antecedents to logistics innovation have focused on firm-level attributes while largely neglecting micro-level attributes (Richey et al., 2005; Tanskanen et al., 2015). We enhance this research by drawing on the organizational management literature to reveal the impact of various combinations of individual-level (self-efficacy, willingness to change, and creativity) and job-level attributes (job satisfaction, training, and job complexity) on logistics innovation. This research makes a useful contribution by integrating these individual- and job-level attributes into the discussion of logistics innovation from a theory-based supply chain management perspective.

Second, we augment the scarce literature exploring gender-related differences in supply chain (Maloni et al., 2019; Nix and Stiffler, 2018) as well as the innovation process (Alsos et al., 2013; Østergaard

Table 7
Comparison of PLS-SEM and QCA findings – women and men.

Method		*Women*		*Men*	
		PLS-SEM	*QCA*	*PLS-SEM*	*QCA*
Solutions		1 solution	4 solutions	1 solution	7 solutions
Model strength		Weak/moderate r^2 (0.35)	Good coverage (0.57)	Weak r^2 (0.17)	Substantial coverage (0.77)
Logistics innovation antecedents	*Self-efficacy*	Not significant	Present in 1 solution	Not significant	Present in 4 solutions
	Willingness to change	Not significant	Absent in all solutions	Not significant	Present in 3 solutions
	Creativity	Not significant	Present in 2 solutions	Not significant	Present in 5 solutions
	Job satisfaction	Medium effect	Present in 2 solutions	Not significant	Present in 2 solutions
	Training	Not significant	Present in 2 solutions	Weak effect	Present in 3 solutions
	Job complexity	Not significant	Present in 2 solutions	Not significant	Present in 4 solutions

et al., 2011). The solutions provide empirical evidence for the need to consider the role of gender when exploring supply chain management phenomena, lending strong support for the proposition from Alsos et al. (2013, p. 243) that "there may be more complex relationships between gender and involvement in industry innovation." Curiously, there is very little overlap between the solutions for women and those for men. Specifically, only Solution 2 is shared by the two groups, suggesting substantial differences between what enables women and men to take part in logistics innovation.

Third, by adopting the lens of complexity theory and employing QCA, we move beyond the all-or-nothing constraints of regression-based or PLS-SEM methods. In detail, the PLS-SEM findings provide minimal insights into the drivers of logistics innovation for men and women, but the QCA results allow us to account for asymmetric relationships to indicate how different combinations of individual- and job-level attributes can lead to high levels of logistics innovation. From a methodological standpoint, this study thereby contributes to the contrast between PLS-SEM and QCA. While the two methods can be complementary, we are able to employ QCA in this study to provide a deeper understanding of the non-linear and complex effects of different drivers of logistics innovation. For example, for men, high job satisfaction leads to high logistics innovation when this is accompanied by the attributes captured in Solutions 1 and 2. On the other hand, low job satisfaction leads to high logistics innovation when this is accompanied by the attributes captured in Solutions 4, 5, and 7. Moreover, when accompanied by the attributes captured in Solutions 3 and 6, the level of job satisfaction is unimportant (i.e., high logistics innovation can occur with high or low job satisfaction). Similarly, for women, high job satisfaction leads to high logistics innovation when accompanied by the attributes captured in Solutions 1 and 2, while low job satisfaction leads to high logistics innovation when accompanied by the attributes captured in Solutions 3 and 4.

Fourth, no single attribute must be present in all solutions. In other words, neither women nor men signal a "must-have" job-level or individual-level attribute in order to engage in logistics innovation. This indicates that firms might supplement the absence of any one attribute considered in this study via combinations of other individual- and job-level attributes. This may also indicate that other factors, not accounted for in our model, can influence logistics innovation, further providing support for the tenets of complexity theory that most real-life phenomena are often too convoluted to be fully explained by even several factors (Awe et al., 2020; Ordanini et al., 2014; Woodside, 2014). In our case, Solutions 3 and 4 for women and Solution 7 for men indicate that it is rather naïve to claim that any single model can account for all the variation in an outcome variable. Combined, these findings further illustrate the importance of accounting for the complexity associated with supply chain phenomena such as innovation to illuminate unique insights and enhance theory (Carter et al., forthcoming).

6.2. Practical implications

Our findings also present relevant implications for logistics managers. Above all, they support the need for managerial consideration of gender differences in logistics innovation. Although the global base of consumers is half female, the logistics workforce is not. Logistics is typically described as a male-dominated field, with a lack of women in high-level positions (Zinn and Goldsby, 2019). Our results highlight the imperative for managers to be mindful that diversifying their workforce and innovation teams can yield a deeper understanding of customer needs (Bansal, 2019). Indeed, Larson (2019) reveals that gender diversity does enhance logistics performance.

However, the gender imbalance in logistics suggests that we do not have the right capabilities in place for innovation. Scholars have already highlighted the need for male-dominated organizations to consider women during the innovation process, framing innovation as functioning differently for men versus women (Foss et al., 2013). Perhaps more importantly, scholars position "innovation as a gender biased phenomenon" (Alsos et al., 2013, p. 236). Overall, innovation functions more effectively with heterogeneous teams, given the interface of associated broader bases of available knowledge and experiences (Østergaard et al., 2011). Similarly, heterogeneous teams boost intra-group conflict to avoid defaulting to fast and easy decisions (Priem et al., 1995; Van der Vegt and Janssen, 2003).

However, merely including women in logistics innovation may not be sufficient. One reason for this is that logistics has traditionally been ineffective at change management, which has resulted in lower levels of successful change compared to other areas in an organization (Greer and Ford, 2009). Furthermore, logistics managers must understand how diversity will impact the overall innovation process. For instance, Østergaard et al. (2011) highlight the difficulty in building an innovation team, as either too little or too much diversity can be detrimental. Moreover, adding diversity to innovation teams can also have negative consequences by creating excessive socio-emotional conflict that can impede innovation (Østergaard et al., 2011). Additionally, research has found inconsistent effects of gender diversity on innovation outcomes. For instance, Díaz-García et al. (2013) position gender diversity as advantageous for radical but not incremental innovation. Such tradeoffs and unclear outcomes from diversity challenge managers to rigorously evaluate the innovation team development process and then monitor the team's dynamics and progress to ensure innovation is enhanced and not stifled.

In this vein, firm managers should be aware that, typically, women and men require unique and distinct individual-level attributes and must be offered unique and distinct job-specific conditions to drive logistics innovation. While some overlap does exist (i.e., Solution 2), the majority of combinations are distinct. Likewise, there is no single individual-level or job-level attribute that must be present for logistics innovation to occur. As such, managers can utilize the solutions offered in this study to determine how to better organize their existing resources to support employee engagement in logistics innovation. To illustrate, for female employees, firms can experience high logistics innovation when dealing with logistics tasks where the job complexity is high by delegating those tasks to women who display high job satisfaction, are creative, and have had substantial training (Solution 2), or to women who display high job satisfaction, have a high level of self-efficacy, are creative, and have had substantial training (Solution 1). Similarly, for male employees, firms can experience high logistics innovation when dealing with high job complexity by delegating those tasks to men who display high levels of job satisfaction, are creative, and have had substantial training (Solution 2) or to men who display high levels of job satisfaction, high levels of willingness to change, high self-efficacy, and are creative (Solution 1). Managers can utilize the survey measures presented in Table 1 to assess their employees' personal attributes as well as their perception of the job-related attributes to better match logistics innovation team members.

Extending this idea, one possible interpretation from the breadth of our solutions is that the field of logistics may have underinvested in innovation. That is, our professionals are only "trying to get by" with the individual- and job-level attributes that are already available to them versus those that have been enhanced by the organization via training and work design. More explicitly, education and training for logistics professionals typically focus heavily on the expansive and complicated body of knowledge needed to manage logistics functions. Innovation does not seem to be part of our training or even our vocabulary, perhaps because the scale and scope of daily logistics firefighting divert our professionals from strategic and innovative thinking. Perhaps logistics organizations have not taken steps to overcome such challenges. Still, Amazon certainly represents an exception to this notion. Despite processing millions of orders each day, Amazon has been able to virtually singlehandedly position logistics as a competitive differentiator to innovate customer expectations for ordering and delivery. The idea that Amazon's competition has been unable to innovate to match their capabilities suggests this competition is underinvesting in and undervaluing logistics innovation.

As a closing managerial implication, logistics organizations could use diversity in innovation processes to address its systemic talent dilemma (Nix and Stiffler, 2018; Zinn et al., 2018). Logistics suffers from not only a shortage of access to new professionals but also the aforementioned gender gap, including women in leadership positions. Logistics can make more concerted efforts to break away from traditional male-dominated organizational structures, with the resulting diverse leadership enriching the female voice and generating more "outside-the-box" ideas (Acker, 1990; Hewlett et al., 2013). Moreover, engaging logistics employees in both incremental and radical innovations can possibly help the field build a stronger, more dynamic image to attract young professionals as the innovation process itself can stimulation employee enthusiasm and enhance the scope of change (Putnik et al., 2019). Ultimately, leading logistics employers can apply this innovation angle to both attract and retain top and diverse talent as a competitive advantage for both innovation and performance (Hewlett et al., 2013).

7. Limitations and future research

One limitation of our study is specific to QCA, which, contrary to regression-based approaches, does not seek to offer generalizable findings. Similar to qualitative approaches, however, it unpacks the complexity associated with the phenomenon. As such, future studies could empirically test the solutions uncovered in this study. In addition, several of the solutions (e.g., Solutions 3 and 4 for women and Solution 7 for men) exhibit all attributes with either a "low" or "not present" score. It is, therefore, plausible that other attributes compensate for high innovation in these recipes. Consequently, future studies should seek to explore additional individual- and job-level attributes, such as openness, future orientation, risk-taking, and personality factors (Marcati et al., 2008; Ruvio et al., 2014). In a similar vein, future studies could also incorporate firm-level attributes (e.g., organizational maturity, in-house design capability, employee welfare, and customer orientation) as well as industry-level attributes (e.g., firm reputation, industry dynamism, industry complexity) (Gledson and Phoenix, 2017; Lin et al., 2010; Manley and Mcfallan, 2006; Wang et al., 2016; Wei et al., 2020). Supply chain capabilities, such as relationships, trust, and knowledge integration (Koskinen and Vanharanta, 2002; Revilla and Villena, 2012; Wang et al., 2011) could also be impactful as logistics innovation antecedents.

As another opportunity, the existing literature maintains that other forms of diversity beyond gender impact the innovation process (Hewlett et al., 2013). Future research could also assess inherent diversity such as race, ethnicity, culture, and age, as well as acquired diversity such as education and career (including fields beyond logistics) (Bansal, 2019; Bogers et al., 2018; Østergaard et al., 2011). Likewise, research could study gender differences in important innovation roles like boundary-spanners, as highlighted by Grawe et al. (2015). Furthermore, logistics managers and scholars need to be better informed of how innovation functions in our field. For instance, Iddris (2016) identifies four dimensions of innovation capabilities in idea management, idea implementation, collaboration, and learning. Our results imply the need to evaluate gender differences in these steps. Future studies could also be extended to incorporate less-used theories in supply chain and logistics (e.g., job-demand resource theory, person-environment theory, role theory, and social exchange theory) to understand the role of the different kinds of resources (e.g., people, technology) that organizations must develop to successfully adopt disruptive technologies (i.e., artificial intelligence, augmented reality, blockchain) (Gligor et al., 2019).

8. Conclusion

To close, we again emphasize that logistics innovation is now more important than ever given emerging technologies, rapidly evolving consumer expectations for omnichannel distribution, and the breadth and impact of disruptions across global supply chains. The current pandemic has not only highlighted the importance of logistics but also further stressed the need for deep-seated logistics innovation. Employee diversity supports a more effective innovation process (Hewlett et al., 2013). The results herein underscore the urgent need for more research on the human side of innovation in logistics, including the diversity in our field. Doing so will make our research more effective in improving not only logistics innovation but also the satisfaction of our increasingly diverse logistics workforce.

Acknowledgements

The corresponding author would like to thanks to Fondazione Cariverona for its funding. This research was part of the 'IT - compatible business models for technology transfer and system optimisation"(Grant number: 8955/2017 Bando Ricerca Scientifica). He would like to acknowledge the contributions of research assistant, Ilaria Ciccarese, for her help with data collection and Ilenia Confente (University of Verona) for her support that facilitated his work.

References

Abukhait, R.M., Bani-Melhem, S., Zeffane, R., 2019. Empowerment, knowledge sharing and innovative behaviours: exploring gender differences. Int. J. Innovat. Manag. 23 (1), 1950006.
Acar, A.Z., 2020. The mediating role of value innovation between market orientation and business performance: evidence from the logistics industry. Int. J. Bus. Innovat. Res. 21 (4), 540–563.
Acker, J., 1990. Hierarchies, jobs, bodies: a theory of gendered organizations. Gend. Soc. 4 (2), 139–158.
Ahlin, B., Drnovšek, M., Hisrich, R.D., 2014. Entrepreneurs' creativity and firm innovation: the moderating role of entrepreneurial self-efficacy. Small Bus. Econ. 43 (1), 101–117.
Akdol, B., Arikboga, F.S., 2015. The effects of leader behavior on job satisfaction: a research on technology Fast50 Turkey companies. Proc. Soc. Behav. Sci. 195, 278–282.
Alameri, M., Ameen, A., Isaac, O., Khalifa, G.S., Bhaumik, A., 2019. Examining the moderating influence of job complexity on the relationships between empowering leadership and organizational innovation. Test Eng. Manag. 81, 1930–1937.
Alsos, G.A., Hytti, U., Ljunggren, E., 2013. Gender and innovation: state of the art and a research agenda. Int. J. Gender Entrepreneur. 5 (3), 236–256.
Amanatullah, E.T., Morris, M.W., 2010. Negotiating gender roles: gender differences in assertive negotiating are mediated by women's fear of backlash and attenuated when negotiating on behalf of others. J. Pers. Soc. Psychol. 98 (2), 256–267.
Ambulkar, S., Blackhurst, J.V., Cantor, D.E., 2016. Supply chain risk mitigation competency: an individual-level knowledge-based perspective. Int. J. Prod. Res. 54 (5), 1398–1411.
Amling, A., Daugherty, P.J., 2018. Logistics and distribution innovation in China. Int. J. Phys. Distrib. Logist. Manag. 50 (3), 323–332.
Andersson, P., Forslund, H., 2018. Developing an indicator framework for measuring sustainable logistics innovation in retail. Measur. Bus. Excellance 22 (1), 1–10.
Atwater, C., Gopalan, R., Lancioni, R., Hunt, J., 2010. To change or not to change: how motor carriers responded following 9/11. J. Bus. Logist. 31 (2), 129–155.
Audenaert, M., Vanderstraeten, A., Buyens, D., 2017. When innovation requirements empower individual innovation: the role of job complexity. Person. Rev. 46 (3), 608–623.
Autry, C.W., Griffis, S.E., 2008. Supply chain capital: the impact of structural and relational linkages on firm execution and innovation. J. Bus. Logist. 29 (1), 157–173.
Awe, O.A., Woodside, A.G., Nerur, S., Prater, E., 2020. Capturing heterogeneities in orchestrating resources for accurately forecasting high (separately low) project management performance. Int. J. Prod. Econ. 224, 107556.
Bagozzi, R.P., Yi, Y., 1988. On the evaluation of structural equation models. J. Acad. Market. Sci. 16 (1), 74–94.
Bandura, A., 2010. Self-efficacy. In: Weiner, I.B., Craighead, W.E. (Eds.), The Corsini Encyclopedia of Psychology. John Wiley & Sons, Hoboken, NJ, pp. 1534–1536.
Bansal, A., 2019. Importance of a Diverse Workforce in Logistic Industry. Entrepreneur. https://www.entrepreneur.com/article/325728.
Björklund, M., Forslund, H., 2018. Exploring the sustainable logistics innovation process. Ind. Manag. Data Syst. 118 (1), 204–217.
Blake, M.K., Hanson, S., 2005. Rethinking innovation: context and gender. Environ. Plann.: Eco. Space 37 (4), 681–701.
Bogers, M., Foss, N.J., Lyngsie, J., 2018. The "human side" of open innovation: the role of employee diversity in firm-level openness. Res. Pol. 47 (1), 218–231.
Børing, P., 2017. The relationship between training and innovation activities in enterprises. Int. J. Train. Dev. 21 (2), 113–129.
Byrne, D., Callaghan, G., 2013. Complexity Theory and the Social Sciences: the State of the Art. Routledge, London.

Carter, C., Ketchen, D., Kaufmann, L., forthcoming. Configural approaches to theory development in supply chain management: leverage unexplored opportunities. J. Supply Chain Manag..
Chen, H., Jin, Y., Huo, B., 2020. Understanding logistics and distribution innovations in China. Int. J. Phys. Distrib. Logist. Manag. 50 (3), 313–322.
Chen, Y., Zhou, X., 2017. Entrepreneurial self-efficacy and firms' innovation behavior: the negative mediating role of social capital. SBP (Soc. Behav. Pers.) 45 (9), 1553–1562.
Chong, A.Y.-L., Zhou, L., 2014. Demand chain management: relationships between external antecedents, web-based integration and service innovation performance. Int. J. Prod. Econ. 154, 48–58.
Christopher, M., Holweg, M., 2011. "Supply Chain 2.0": managing supply chains in the era of turbulence. Int. J. Phys. Distrib. Logist. Manag. 41 (1), 63–82.
Dai, J., Cantor, D.E., Montabon, F.L., 2015. How environmental management competitive pressure affects a focal firm's environmental innovation activities: a green supply chain perspective. J. Bus. Logist. 36 (3), 242–259.
Dayan, M., Zacca, R., Husain, Z., Di Benedetto, A., Ryan, J.C., 2016. The effect of entrepreneurial orientation, willingness to change, and development culture on new product exploration in small enterprises. J. Bus. Ind. Market. 31 (5), 668–683.
Derwik, P., Hellström, D., Karlsson, S., 2016. Manager competences in logistics and supply chain practice. J. Bus. Res. 69 (11), 4820–4825.
Díaz-García, C., González-Moreno, A., Jose Saez-Martinez, F., 2013. Gender diversity within R&D teams: its impact on radicalness of innovation. Innovation 15 (2), 149–160.
Ellinger, A.E., Ellinger, A.D., Keller, S.B., 2002. Logistics managers' learning environments and firm performance. J. Bus. Logist. 23 (1), 19–37.
Eroglu, C., Knemeyer, A.M., 2010. Exploring the potential effects of forecaster motivational orientation and gender on judgmental adjustments of statistical forecasts. J. Bus. Logist. 31 (1), 179–195.
Fiss, P.C., 2011. Building better causal theories: a fuzzy set approach to typologies in organization research. Acad. Manag. J. 54 (2), 393–420.
Flint, D.J., Larsson, E., Gammelgaard, B., 2008. Exploring processes for customer value insights, supply chain learning and innovation: an international study. J. Bus. Logist. 29 (1), 257–281.
Flint, D.J., Larsson, E., Gammelgaard, B., Mentzer, J.T., 2005. Logistics innovation: a customer vaue-oriented social process. J. Bus. Logist. 26 (1), 113–147.
Fornell, C., Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. J. Market. Res. 18 (1), 39–50.
Foss, L., Woll, K., Moilanen, M., 2013. Creativity and implementations of new ideas: do organisational structure, work environment and gender matter? Int. J. Gender Entrepreneur. 5 (3), 298–322.
Gilson, L.L., Mathieu, J.E., Shalley, C.E., Ruddy, T.M., 2005. Creativity and standardization: complementary or conflicting drivers of team effectiveness? Acad. Manag. J. 48 (3), 521–531.
Gledson, B.J., Phoenix, C., 2017. Exploring organisational attributes affecting the innovativeness of UK SMEs. Construct. Innovat. 17 (2), 224–243.
Gligor, D., 2018. Performance implications of the fit between suppliers' flexibility and their customers' expected flexibility: a dyadic examination. J. Oper. Manag. 58 (1), 73–85.
Gligor, D., Bozkurt, S., 2020. fsQCA versus regression: the context of customer engagement. J. Retailing Consum. Serv. 52, 101929.
Gligor, D., Bozkurt, S., Russo, I., 2019. Achieving customer engagement with social media: a qualitative comparative analysis approach. J. Bus. Res. 101, 59–69.
Gligor, D., Feizabadi, J., Russo, I., Maloni, M.J., Goldsby, T.J., 2020. The triple-a supply chain and strategic resources: developing competitive advantage. Int. J. Phys. Distrib. Logist. Manag. 50 (2), 159–190.
Gligor, D.M., Holcomb, M.C., Stank, T.P., 2013. A multidisciplinary approach to supply chain agility: conceptualization and scale development. J. Bus. Logist. 34 (2), 94–108.
Goldsby, T.J., Zinn, W., 2016. Technology innovation and new business models: can logistics and supply chain research accelerate the evolution? J. Bus. Logist. 37 (2), 80–81.
González, X., Miles-Touya, D., Pazó, C., 2016. R&D, worker training and innovation: firm-level evidence. Ind. Innovat. 23 (8), 694–712.
Grawe, S.J., 2009. Logistics innovation: a literature-based conceptual framework. Int. J. Logist. Manag. 20 (3), 360–377.
Grawe, S.J., Autry, C.W., Daugherty, P.J., 2014. Organizational implants and logistics service innovation: a relational social capital perspective. Transport. J. 53 (2), 180–210.
Grawe, S.J., Daugherty, P.J., Ralston, P.M., 2015. Enhancing dyadic performance through boundary spanners and innovation: an assessment of service provider-customer relationships. J. Bus. Logist. 36 (1), 88–101.
Grawe, S.J., Daugherty, P.J., Roath, A.S., 2011. Knowledge synthesis and innovative logistics processes: enhancing operational flexibility and performance. J. Bus. Logist. 32 (1), 69–80.
Greckhamer, T., Furnari, S., Fiss, P.C., Aguilera, R.V., 2018. Studying configurations with qualitative comparative analysis: best practices in strategy and organization research. Strat. Organ. 16 (4), 482–495.
Greer, B.M., Ford, M.W., 2009. Managing change in supply chains: a process comparison. J. Bus. Logist. 30 (2), 47–63.
Grosser, T.J., Venkataramani, V., Labianca, G.J., 2017. An alter-centric perspective on employee innovation: the importance of alters' creative self-efficacy and network structure. J. Appl. Psychol. 102 (9), 1360–1374.
Hackman, J.R., Hackman, R.J., Oldham, G.R., 1980. Work Redesign. Addison-Wesley, Reading, MA.
Hair, J.F., Ringle, C.M., Sarstedt, M., 2011. PLS-SEM: indeed a silver bullet. J. Market. Theor. Pract. 19 (2), 139–151.
Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. Eur. Bus. Rev. 31 (1), 2–24.
Hallak, R., Assaker, G., O'Connor, P., Lee, C., 2018. Firm performance in the upscale restaurant sector: the effects of resilience, creative self-efficacy, innovation and industry experience. J. Retailing Consum. Serv. 40, 229–240.
Hammond, M.M., Neff, N.L., Farr, J.L., Schwall, A.R., Zhao, X., 2011. Predictors of individual-level innovation at work: a meta-analysis. Psychology of Aesthetics, Creativity, and the Arts 5 (1), 90–105.
Hewlett, S.A., Marshall, M., Sherbin, L., 2013. How diversity can drive innovation. Harv. Bus. Rev. 91 (12), 30-30.
Hoberg, K., Thornton, L., Wieland, A., 2020. How to deal with the human factor in supply chain management? Int. J. Phys. Distrib. Logist. Manag. 50 (2), 151–158.
Holcomb, M.C., Liao-Troth, S., Manrodt, K.B., 2014. A shift in fundamentals: the changing direc-tion in logistics and transportation management. Transport. J. 53 (4), 516–533.
Holmqvist, M., Stefansson, G., 2006. `Smart goods' and mobile RFID: a case with innovation from Volvo. J. Bus. Logist. 27 (2), 251–272.
Hon, A.H., Lui, S.S., 2016. Employee creativity and innovation in organizations: review, integration, and future directions for hospitality research. Int. J. Contemp. Hospit. Manag. 28 (5), 862–885.
Horbach, J., Jacob, J., 2018. The relevance of personal characteristics and gender diversity for (eco-) innovation activities at the firm-level: results from a linked employer–employee database in Germany. Bus. Strat. Environ. 27 (7), 924–934.
Hull, C., 2016. Innovation and diversity in transport and logistics. MHD Supply Chain Solutions 46 (2), 16.
Hurt, H.T., Joseph, K., Cook, C.D., 1977. Scales for the measurement of innovativeness. Hum. Commun. Res. 4 (1), 58–65.
Iddris, F., 2016. Measurement of innovation capability in supply chain: an exploratory study. Int. J. Innovat. Sci. 8 (4), 331–349.
Jeng, S.P., 2018. Enhancing the creativity of frontline employees: the effects of job complexity and customer orientation. Int. J. Logist. Manag. 29 (1), 387–408.
Jermsittiparsert, K., Srihirun, W., 2019. Leadership in supply chain management: role of gender as moderator. Int. J. Innov. Creativity Change 5 (2), 448–466.
Jöreskog, K.G., Wold, H.O.A., 1982. The ML and PLS techniques for modeling with latent variables: historical and comparative aspects. In: Wold, H.O.A., Jöreskog, K.G. (Eds.), Systems under Indirect Observation, Part I. North-Holland, Amsterdam, pp. 263–270.
Kabasheva, I.A., Rudaleva, I., Bulnina, I., Askhatova, L., 2015. Organizational factors affecting employee innovative behavior. Mediterr. J. Soc. Sci. 6 (1 S3), 435.
Keller, S.B., Ozment, J., 2009. Research on personnel issues published in leading logistics journals: what we know and don't know. Int. J. Logist. Manag. 20 (3), 378–407.
Klumpp, M., Zijm, H., 2019. Logistics innovation and social sustainability: how to prevent an artificial divide in human–computer interaction. J. Bus. Logist. 40 (3), 265–278.
Kock, N., 2015. Common method bias in PLS-SEM: a full collinearity assessment approach. Int. J. e-Collaboration 11 (4), 1–10.
Koskinen, K.U., Vanharanta, H., 2002. The role of tacit knowledge in innovation processes of small technology companies. Int. J. Prod. Econ. 80 (1), 57–64.
Kosmol, T., Reimann, F., Kaufmann, L., 2018. Co-alignment of supplier quality management practices and cognitive maps–A neo-configurational perspective. J. Purch. Supply Manag. 24 (1), 1–20.
Kvidal, T., Ljunggren, E., 2014. Introducing gender in a policy programme: a multilevel analysis of an innovation policy programme. Environ. Plann. C Govern. Pol. 32 (1), 39–53.
Lambert, E.G., Hogan, N.L., 2010. Wanting change: the relationship of perceptions of organizational innovation with correctional staff job stress, job satisfaction, and organizational commitment. Crim. Justice Pol. Rev. 21 (2), 160–184.
Larson, P.D., 2019. Corruption, gender inequality and logistics performance. Int. J. Logist. Manag. 31 (2), 381–397.
Lii, P., Kuo, F.-I., 2016. Innovation-oriented supply chain integration for combined competitiveness and firm performance. Int. J. Prod. Econ. 174, 142–155.
Lin, Y., Wang, Y., Yu, C., 2010. Investigating the drivers of the innovation in channel integration and supply chain performance: a strategy orientated perspective. Int. J. Prod. Econ. 127 (2), 320–332.
Liu, D., Gong, Y., Zhou, J., Huang, J.-C., 2017. Human resource systems, employee creativity, and firm innovation: the moderating role of firm ownership. Acad. Manag. J. 60 (3), 1164–1188.
Luthans, F., Youssef, C.M., Avolio, B.J., 2007. Psychological Capital: Developing the Human Competitive Edge. Oxford University Press, Oxford, UK.
Mackie, J.L., 1974. The Cement of the Universe: A Study of Causation. Clarendon Press, Oxford, UK.
Maloni, M.J., Gligor, D.M., Cheramie, R.A., Boyd, E.M., 2019. Supervisor and mentoring effects on work-family conflict in logistics. Int. J. Phys. Distrib. Logist. Manag. (49), 6.
Manley, K., Mcfallan, S., 2006. Exploring the drivers of firm-level innovation in the construction industry. Construct. Manag. Econ. 24 (9), 911–920.
Marcati, A., Guido, G., Peluso, A.M., 2008. The role of SME entrepreneurs' innovativeness and personality in the adoption of innovations. Res. Pol. 37 (9), 1579–1590.
Marlow, S., McAdam, M., 2012. Analyzing the influence of gender upon high–technology venturing within the context of business incubation. Enterpren. Theor. Pract. 36 (4), 655–676.
Marxt, C., Link, P., 2002. Success factors for cooperative ventures in innovation and production systems. Int. J. Prod. Econ. 77 (3), 219–229.

McCrea, B., 2018. Women in the Supply Chain: How Far Have We Come? Logistics Management. www.logisticsmgmt.com/article/women_in_logistics_how_far_have_we_come.
McGuirk, H., Lenihan, H., Hart, M., 2015. Measuring the impact of innovative human capital on small firms' propensity to innovate. Res. Pol. 44 (4), 965–976.
Melnyk, S.A., Ritchie, W.J., Calantone, R.J., 2013. The case of the C-TPAT border security initiative: assessing the adoption/persistence decisions when dealing with a novel, institutionally driven administrative innovation. J. Bus. Logist. 34 (4), 289–300.
Meuer, J., Fiss, P.C., 2020. Qualitative Comparative Analysis in Business and Management Research. Oxford University Press, Oxford, UK.
Mincer, J., 1962. On-the-job training: costs, returns, and some implications. J. Polit. Econ. 70, 50–79, 5, Part 2.
Misangyi, V.F., Greckhamer, T., Furnari, S., Fiss, P.C., Crilly, D., Aguilera, R., 2017. Embracing causal complexity: the emergence of a neo-configurational perspective. J. Manag. 43 (1), 255–282.
Mohanty, R.P., Prakash, A., 2014. Green supply chain management practices in India: an empirical study. Prod. Plann. Control 25 (16), 1322–1337.
Montalvo, C., 2006. What triggers change and innovation? Technovation 26 (3), 312–323.
Moreira, M.F., de Aquino Guimarães, T., Philippe, J., 2016. Change and innovation: an observable relationship in services? RAI Revista de Administração e Inovação 13 (2), 135–144.
Morgeson, F.P., Humphrey, S.E., 2006. The Work Design Questionnaire (WDQ): developing and validating a comprehensive measure for assessing job design and the nature of work. J. Appl. Psychol. 91 (6), 1321–1339.
Na, K., 2021. The effect of on-the-job training and education level of employees on innovation in emerging markets. J. Open Innov.: Technol. Market Complexity 7 (1), 47.
Nix, N., Stiffler, D., 2018. WOMEN in supply chain. Supply Chain Manag. Rev. 20 (5), 44–51.
O'Brien, C., Smith, S., 1995. Strategies for encouraging and managing technological innovation. Int. J. Prod. Econ. 41 (1–3), 303–310.
O'Marah, K., 2016. It's Time to Put More Women at the Top of the Supply Chain. www.industryweek.com/supply-chain/it-s-time-put-more-women-top-supply-chain.
Oldham, G.R., Cummings, A., 1996. Employee creativity: personal and contextual factors at work. Acad. Manag. J. 39 (3), 607–634.
Oldham, G.R., Kulik, C.T., Ambrose, M.L., Stepina, L.P., Brand, J.F., 1986. Relations between job facet comparisons and employee reactions. Organ. Behav. Hum. Decis. Process. 38 (1), 28–47.
Omar, A., Davis-Sramek, B., Fugate, B.S., Mentzer, J.T., 2012. Exploring the complex social processes of organizational change: supply chain orientation from a manager's perspective. J. Bus. Logist. 33 (1), 4–19.
Ordanini, A., Parasuraman, A., Rubera, G., 2014. When the recipe is more important than the ingredients: a qualitative comparative analysis (QCA) of service innovation configurations. J. Serv. Res. 17 (2), 134–149.
Østergaard, C.R., Timmermans, B., Kristinsson, K., 2011. Does a different view create something new? The effect of employee diversity on innovation. Res. Pol. 40 (3), 500–509.
Ouakouak, M.L., Ouedraogo, N., 2017. Antecedents of employee creativity and organisational innovation: an empirical study. Int. J. Innovat. Manag. 21 (7), 1750060.
Papa, A., Dezi, L., Gregori, G.L., Mueller, J., Miglietta, N., 2018. Improving innovation performance through knowledge acquisition: the moderating role of employee retention and human resource management practices. J. Knowl. Manag. 24 (3), 589–605.
Pappas, I.O., Woodside, A.G., 2021. Fuzzy-set Qualitative Comparative Analysis (fsQCA): guidelines for research practice in information systems and marketing. Int. J. Inf. Manag. 58, 102310.
Park, D., Krishnan, H.A., 2005. Gender differences in supply chain management practices. Int. J. Manag. Enterprise Dev. 2 (1), 27–37.
Park, Y., Fiss, P.C., El Sawy, O.A., 2020. Theorizing the multiplicity of digital phenomena: the ecology of configurations, causal recipes, and guidelines for applying QCA. MIS Q. 44 (4), 1493–1520.
Parrotta, P., Pozzoli, D., Pytlikova, M., 2014. The nexus between labor diversity and firm's innovation. J. Popul. Econ. 27 (2), 303–364.
Perrenoud, A.J., Bigelow, B.F., Perkins, E.M., 2020. Advancing women in construction: gender differences in attraction and retention factors with managers in the electrical construction industry. J. Manag. Eng. 36 (5), 04020043.
Pettit, T.J., Fiksel, J., Croxton, K.L., 2010. Ensuring supply chain resilience: development of a conceptual framework. J. Bus. Logist. 31 (1), 1–21.
Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J. Appl. Psychol. 88 (5), 879.
Pons, F.J., Ramos, J., Ramos, A., 2016. Antecedent variables of innovation behaviors in organizations: differences between men and women. Eur. Rev. Appl. Psychol. 66 (3), 117–126.
Poutanen, S., Kovalainen, A., 2013. Gendering innovation process in an industrial plant–Revisiting tokenism, gender and innovation. Int. J. Gender Entrepreneur. 5 (3), 257–274.
Prasetio, A.P., Yuniarsih, T., Ahman, E., 2017. Job satisfaction, organizational commitment, and organizational citizenship behaviour in state-owned banking. Universal J. Manag. 5 (1), 32–38.
Priem, R.L., Harrison, D.A., Muir, N.K., 1995. Structured conflict and consensus outcomes in group decision making. J. Manag. 21 (4), 691–710.
Putnik, K., Oeij, P., Dhondt, S., van der Torre, W., de Vroome, E., Preenen, P., 2019. Innovation adoption of employees in the logistics sector in The Netherlands: the role of workplace innovation. European J. Workplace Innov. 4 (2), 176–192.
Ragin, C.C., 2008. Measurement versus calibration: a set-theoretic approach. In: Box-Steffensmeier, J.M., Brady, H.E., Collier, D. (Eds.), The Oxford Handbook of Political Methodology. Oxford University Press, Oxford, UK.
Ragin, C.C., 2009. Qualitative comparative analysis using fuzzy sets (fsQCA). In: Rihoux, B., Ragin, C.C. (Eds.), Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques. SAGE Publications, Thousand Oaks, CA, pp. 87–121.
Ralston, P.M., Grawe, S.J., Daugherty, P.J., 2013. Logistics salience impact on logistics capabilities and performance. Int. J. Logist. Manag. 24 (2), 136–152.
Reichert, F.M., Zawislak, P.A., Arundel, A., 2016. Exploring innovation success recipes in low-technology firms using fuzzy-set QCA. J. Bus. Res. 69 (11), 5437–5441.
Revilla, E., Villena, V.H., 2012. Knowledge integration taxonomy in buyer–supplier relationships: trade-offs between efficiency and innovation. Int. J. Prod. Econ. 140 (2), 854–864.
Richey, R.G., Genchev, S.E., Daugherty, P.J., 2005. The role of resource commitment and innovation in reverse logistics performance. Int. J. Phys. Distrib. Logist. Manag. 35 (4), 233–257.
Rihoux, B., Ragin, C.C., 2008. Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques. Sage Publications, Thousand Oaks, CA.
Rogers, M., 2004. Networks, firm size and innovation. Small Bus. Econ. 22 (2), 141–153.
Rudman, L.A., Phelan, J.E., 2008. Backlash effects for disconfirming gender stereotypes in organizations. Res. Organ. Behav. 28, 61–79.
Russo, I., Confente, I., Gligor, D., Cobelli, N., 2019. A roadmap for applying qualitative comparative analysis in supply chain research: the reverse supply chain case. Int. J. Phys. Distrib. Logist. Manag. 49 (1), 99–120.
Ruvio, A.A., Shoham, A., Vigoda-Gadot, E., Schwabsky, N., 2014. Organizational innovativeness: construct development and cross-cultural validation. J. Prod. Innovat. Manag. 31 (5), 1004–1022.
Sapino Jeffreys, B., 2020. COVID-19 Pushes Supply-Chain Innovation. GlobeSt.com. www.globest.com/2020/06/09/covid-19-pushes-supply-chain-innovation/?slreturn=20210116183701.
Sarstedt, M., Henseler, J., Ringle, C.M., 2011. Multi-group analysis in partial least squares (PLS) path modeling: alternative methods and empirical results. In: Sarstedt, M., Schwaiger, M., Taylor, C.R. (Eds.), Measurement and Research Methods in International Marketing (Advances in International Marketing). Emerald Group Publishing, Bingley, U.K., pp. 195–218
Sawhney, M., Prandelli, E., 2000. Communities of creation: managing distributed innovation in turbulent markets. Calif. Manag. Rev. 42 (4), 24–54.
Schneider, C.Q., Wagemann, C., 2012. Set-theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis. Cambridge University Press, Cambridge, UK.
Scarpi, D., Russo, I., Confente, I., Hazen, B., 2021. Individual antecedents to consumer intention to switch to food waste bioplastic products: a configuration analysis. Ind. Market. Manag. 93 (2021), 578–590.
Shalley, C.E., Gilson, L.L., 2004. What leaders need to know: a review of social and contextual factors that can foster or hinder creativity. Leader. Q. 15 (1), 33–53.
Shalley, C.E., Gilson, L.L., Blum, T.C., 2009. Interactive effects of growth need strength, work context, and job complexity on self-reported creative performance. Acad. Manag. J. 52 (3), 489–505.
Sharma, A., Pathak, S., Borah, S.B., Adhikary, A., 2020. Is it too complex? The curious case of supply network complexity and focal firm innovation. J. Oper. Manag. 66 (7–8), 839–865.
Shipton, H.J., West, M.A., Parkes, C.L., Dawson, J.F., Patterson, M.G., 2006. When promoting positive feelings pays: aggregate job satisfaction, work design features, and innovation in manufacturing organizations. Eur. J. Work. Organ. Psychol. 15 (4), 404–430.
Stank, T., Autry, C., Daugherty, P., Closs, D., 2015. Reimagining the 10 megatrends that will revolutionize supply chain logistics. Transport. J. 54 (1), 7–32.
Tanskanen, K., Holmstrom, J., Ohman, M., 2015. Generative mechanisms of the adoption of logistics innovation: the case of on-site shops in construction supply chains. J. Bus. Logist. 36 (2), 139–159.
Timmer, S., Kaufmann, L., 2017. Conflict minerals traceability – a fuzzy set analysis. Int. J. Phys. Distrib. Logist. Manag. 47 (5), 344–367.
Trivellas, P., Santouridis, I., 2009. TQM and innovation performance in manufacturing SMEs: the mediating effect of job satisfaction. IEEE Int. COnference Indust. Eng. Eng. Manag. 458–462.
Tsai, C.-F., Yen, Y.-F., 2020. Moderating effect of employee perception of responsible downsizing on job satisfaction and innovation commitment. Int. J. Hum. Resour. Manag. 31 (15), 1913–1937.
Tuominen, M., Piippo, P., Ichimura, T., Matsumoto, Y., 1999. An analysis of innovation management systems' characteristics. Int. J. Prod. Econ. 60, 135–143.
Urry, J., 2005. The complexity turn. Theor. Cult. Soc. 22 (5), 1–14.
Van der Vegt, G.S., Janssen, O., 2003. Joint impact of interdependence and group diversity on innovation. J. Manag. 29 (5), 729–751.
Wagner, S.M., 2008. Innovation management in the German transportation industry. J. Bus. Logist. 29 (2), 215–231.
Wang, C.L., Ahmed, P.K., 2004. The development and validation of the organisational innovativeness construct using confirmatory factor analysis. Eur. J. Innovat. Manag. 7 (4), 303–313.
Wang, L., Yeung, J.H.Y., Zhang, M., 2011. The impact of trust and contract on innovation performance: the moderating role of environmental uncertainty. Int. J. Prod. Econ. 134 (1), 114–122.

Wang, Q., Zhao, X., Voss, C., 2016. Customer orientation and innovation: a comparative study of manufacturing and service firms. Int. J. Prod. Econ. 171, 221–230.

Wei, Y., Nan, H., Wei, G., 2020. The impact of employee welfare on innovation performance: evidence from China's manufacturing corporations. Int. J. Prod. Econ. 228, 107753.

Wieland, A., Handfield, R.B., Durach, C.F., 2016. Mapping the landscape of future research themes in supply chain management. J. Bus. Logist. 37 (3), 205–212.

Wille, B., Wiernik, B.M., Vergauwe, J., Vrijdags, A., Trbovic, N., 2018. Personality characteristics of male and female executives: distinct pathways to success? J. Vocat. Behav. 106, 220–235.

Wolf, C.D., 2020. Coronavirus Accelerates Logistics Sector Innovations. Transport Topics. www.ttnews.com/articles/coronavirus-accelerates-logistics-sector-innovations.

Wong, C.W., Wong, C.Y., Boon-Itt, S., 2013. The combined effects of internal and external supply chain integration on product innovation. Int. J. Prod. Econ. 146 (2), 566–574.

Woodside, A.G., 2014. Embrace • perform • model: complexity theory, contrarian case analysis, and multiple realities. J. Bus. Res. 67 (12), 2495–2503.

Woodside, A.G., Nagy, G., Megehee, C.M., 2018. Applying complexity theory: a primer for identifying and modeling firm anomalies. J. Innov. Knowledge 3 (1), 9–25.

Yang, C.-C., Marlow, P.B., Lu, C.-S., 2009. Assessing resources, logistics service capabilities, innovation capabilities and the performance of container shipping services in Taiwan. Int. J. Prod. Econ. 122 (1), 4–20.

Yuan, F., Woodman, R.W., 2010. Innovative behavior in the workplace: the role of performance and image outcome expectations. Acad. Manag. J. 53 (2), 323–342.

Zacher, H., Heusner, S., Schmitz, M., Zwierzanska, M.M., Frese, M., 2010. Focus on opportunities as a mediator of the relationships between age, job complexity, and work performance. J. Vocat. Behav. 76 (3), 374–386.

Zeid, H.A., Assadi, N., Murad, T., 2017. The effect of junior high school teachers' motivation and willingness to change on the diversity of their teaching methods. Theor. Pract. Lang. Stud. 7 (12), 1160–1170.

Zinn, W., Goldsby, T.J., 2019. Supply chain plasticity: redesigning supply chains to meet major environmental change. J. Bus. Logist. 40 (3), 184–186.

Zinn, W., Goldsby, T.J., Cooper, M.C., 2018. Researching the opportunities and challenges for women in supply chain. J. Bus. Logist. 39 (2), 84–86.

Zuraik, A., Kelly, L., Perkins, V., 2020. Gender differences in innovation: the role of ambidextrous leadership of the team leads. Manag. Decis. 58 (7), 1475–1495.