

Firm Strategies and Managerial Choices to Improve Employee Innovation Adoption in the Logistics Industry

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Abstract

This study analyses the mediating role of organisational mindfulness and employee involvement in the relationships between competition strategy and supportive leadership and employee innovation adoption. To investigate this, a unique sample of 116 managers or owners of Dutch logistics companies completed a survey on innovation within their companies and the adoption of innovation by their employees. Results show that a firm's competition strategy that values quality and not only costs, and the presence of organisational mindfulness, a firm's cultural characteristic that makes employees alert to solve issues and improve effective cooperation, is positively related to employee innovation adoption. Moreover, the presence of supportive leadership has both a direct relation with employee innovation adoption, and an indirect one, namely mediated by organisational mindfulness. From the perspective that organisations must better adopt innovations to deal with continuous change, this study emphasizes the need to take into account the impact of the organisational characteristics of competition strategy and supportive leadership, and the organisational cultural characteristic of organisational mindfulness, along with the space that every organisation should utilize to make their own future strategic choices.

Keywords: Employee Innovation Adoption; Competition Strategy; Supportive Leadership; Organisational Mindfulness; Employee Involvement.

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1 Introduction

In order to remain competitive firms have to innovate continuously. Successful innovation depends strongly on the preparedness of a firm's employees to accept and adopt innovation, because the human factor is one of the most important conditions (Ober, 2020). With the ongoing technological change and quickened application of digitalisation technology, like Industry4.0 and the Fourth Industrial Revolution (Schwab, 2016), technology acceptance by employees is crucial for successful competition. This is especially the case in industries where profit margins are

thin and labour is susceptible to be replaced by technology. Such is the case in the logistics sector where there is fierce competition and growing opportunities to digitalise certain tasks of warehouse workers, packers, drivers of internal (e.g. fork lift trucks) and external transport (trucks). Automated guided vehicles in warehouses, automatic driving, augmented reality glasses, sensor technologies and platoon trucking, to mention a few innovations, are becoming the new normal with great speed. This Fourth Industrial Revolution is predicted to transform logistics, and also supply chain management, with delivery systems becoming automated, smart networks popping up everywhere, and Big Data applications being dispersed to every corner (Sullivan & Kern, 2021). Hence, the acceptance of employees to work with innovations is essential to keep up with competitors. However, the acceptance of innovations and new technologies of employees is still quite low in the logistics sector (Putnik et al., 2019a).

The former justifies further research on the influenceable factors that enhance employees' innovation adoption. Recent research, suggests that certain organisational aspects of 'workplace innovation', as defined by team voice and engagement of employees, are highly important for successful implementation of innovation. In fact, studies in the Dutch logistics industry (Putnik et al., 2019a, b) showed that 80% of companies had engaged in innovation in the previous two years. In only 40% of the companies, the innovations were picked up by the employees. Only 10-11% of the companies surveyed had a 'socially innovative climate', i.e. a climate that featured the presence of high job autonomy among employees, team voice, and involvement of employees with operational tasks in decision making. In this group, no less than 90% of the innovations were successful. This suggests that employee involvement and an innovative culture has a major influence on the innovative capacity of organisations through innovation adoption of employees. Approaches such as the above mentioned 'workplace innovation' and 'sociotechnical systems thinking' (Kuipers et al., 2020; Van Amelsvoort & Van Hootegem, 2017) underline the role of a sound organisational design that allows for job autonomy and avoids unnecessary bureaucracy. Such organisational design approaches are conditional to employee involvement and innovation adoption, but are not part of this study.

Although these studies in the logistics industry have given us valuable insights, still little is known about four important but related organisational and cultural factors that impact employee innovation adoption, which we will study in this research: company strategy, supportive leadership, organisational mindfulness (i.e., a firm's cultural characteristic that makes employees alert to solve issues and improve effective cooperation), and employee involvement. This study's purpose is, therefore, to understand if these organisational and cultural factors contribute to employee innovation adoption, how their relationships work, and what firms can do to stimulate such adoption.

To investigate this, we surveyed a sample of 116 managers or owners of Dutch logistics companies, for which renewal is crucial for economic survival. The results of that study will be presented in this article. First, we will discuss the theoretical background of the research, introduce the research concepts and hypotheses. Preceding the unfolding of the results, the methodology and the fieldwork will be explained. In the final sections the conclusions, points of discussion and recommendations are addressed.

This research contributes to the theory and empirical research of employee innovation adoption by showing that both certain organisational factors and organisational cultural factors can enhance the adoption on innovations. Moreover, our study can help companies, managers and policy makers gain valuable and practical insights in influenceable factors for enhancing their employee innovation adoption.

The story line unfolds with the question what are the organisational and cultural or behaviour

factors that may explain employee innovation adoption. First of all, decision makers in organisations can make strategic choices, for example, with regard to competition. We contend that a strategy that creates good jobs will stimulate innovation adoption. Such a so-called 'high road' strategy (Osterman, 2018) assumes the presence of leadership that understands that good jobs do not come out of the blue but are to be designed by decision makers. Organisational factors, such as a chosen competition strategy and style of leadership are subsequently becoming enablers of employee behaviour. Two behavioural factors are studied in this context, namely organisational mindfulness and employee involvement. The first factor points to the alertness at the level of cooperating persons to ensure that employees do the right thing when needed, whereas the second factor expresses active commitment of employees. Once such organisational behaviour is present, it is our assumption that employee innovation adoption of innovation and new technologies is close at hand. Our next step is to seek theoretical foundations for our narrative and subsequently investigate our propositions. In the discussion we want to break a lance for approaches that integrate organisational and behavioural factors when designing jobs and work processes to enable employee innovation adoption. The research question of the study is: What factors determine employee innovation adoption by employees in the logistics industry?

2 Theoretical background and hypotheses

Decision makers in organisations make the choices about what organisations and their people do, both strategically and operationally. In organisational theory, Strategic Choice Theory describes the role that management plays in influencing an organisation through making choices in a dynamic environment (Child, 1997). Previous to this theory, a commonly shared view was that organisations followed operational requirements based on responding to demands of their external environment, in particular market demands, financial limitations, labour market situations, technological progress and laws and regulations. Strategic choice theory provided an alternative that emphasized the agency of individuals and groups within organisations to make choices, that dynamically influence the behaviour of those organisations. These strategic choices help us to understand that organisations can adapt to the external environment as well as to the internal interactions between agents and systems, in a variety of ways. Of course externalities can pose serious restrictions on the space to manoeuvre, but there is always room for choice. These managerial choices are not limited to external factors like markets, pricing and products or services, but also stretch to tangible and intangible internal factors, such as organisational changes and HR measures (Bloom & Van Reenen, 2010).

This article is a follow-up study of the previously discussed investigations in the Dutch logistics industry (Putnik et al., 2019a, 2019b) into factors that influence innovation adoption by employees. We understand these factors to be possibly influenced by managerial behaviour, and thus see these as strategic choices. In our opinion not only structure follows strategy (Chandler, 1962), so does culture; even more, culture follows both strategy and structure. In other words, organisational behaviour can be steered and enabled by managerial choice (Karanika-Murray & Oeij, 2017).

2.1 Employee innovation adoption

Several meta and review studies of the field of innovation adoption unfold that it is a broad concept and yet lacks consensus among researchers (Arts et al., 2011; Mangula et al., 2017; Ober, 2020; Pichlak, 2016; Tornatzky & Klein, 1982; Vagnani et al., 2019; Van Oorschot et al., 2018; Wisdom et al., 2014). The broadness is, for example, shown by the fact that adoption of innovation can be looked at from the perspective of organisations and of individuals. With

regard to individuals, innovation adoption can be performed by decision makers (managers and leaders), employees (operational executers), and consumers and clients (end users). Whether an innovation is adopted, is caused by many underlying reasons, such as characteristics of the innovation itself - including its life cycle, within-organisational characteristics or organisational resources, environmental characteristics, and the preferences, behaviour and attitudes of the agents, management, employees, suppliers, customers and clients (Vagnani et al., 2019). Innovation characteristics, for example, differ in their attributed complexity, relative advantage, observability, risk, trialability, cost-efficacy (e.g., Mangula et al., 2017; Tornatzky & Klein, 1982; Wisdom et al., 2014), and in types of innovation, like administrative vs technical, process vs product and radical vs incremental (Mangula et al., 2017). Innovation adoption is seen by many researchers as a process, consisting of several phases (e.g. Pichlak, 2016): for example, an initiation phase, a decision phase, and implementation phase, and, sometimes an evaluation phase (also referred to as pre-adoption, adoption, and post-adoption) (e.g. Ober, 2020). In this process, located mostly at the organisational level, often a distinction is made between the decision to adopt the innovation and actually accepting and using the innovation. Researchers studying the individual level, tend to distinguish between the intention to adopt an innovation and the actual use (or purchase) of an innovation (e.g. Arts et al., 2011). Many studies in the innovation domain have omitted the innovation adoption perspective by employees, and those that have been carried out are hardly in the logistics sector, but quite often in, for example, health care settings and with respect to the use of information technology (for example Mangula et al., 2017; Ober, 2020; Van Oorschot et al., 2018; Wisdom et al., 2014). All in all, the broadness of the field also explains why there is not much consensus about innovation adoption (Ober, 2020), and that it is regarded as a complex phenomenon (Wisdom et al., 2014), ever since Everett Rogers introduced his diffusion of innovation theory in the sixties (Rogers, 2003).

Innovation adoption is the decision to proceed with the implementation of a new practice, product or working method (Wisdom, et al., 2014). The point of departure is that innovation adoption is a decision process of users (Vagnani et al., 2019). The research on employee innovation adoption draws on the Technology Acceptance Model (Venkatesh et al, 2003) and the Theory of Reasoned Action (Ajzen, 2020), which builds on the Theory of Planned Behaviour (Ajzen, 1991, 2020) as summarised by Van Oorschot et al. (2018). According to the Theory of Planned Behaviour users of innovations will be inclined to apply a renewal when they perceive it as useful, easy to work with, and beneficial for their work performance (Ajzen, 1991, 2020; Venkatesh and Davis, 2000; Venkatesh et al., 2003). In such theoretical models, innovation adoption is often operationalised as 'the actual use of innovation'. Several theoretical frameworks have examined the innovation process in the past. The Technology acceptance theory (Mun et al., 2006; Taherdoost, 2018) indicates that technological aspects of the innovations determine their acceptance, while the Theory of planned behaviour (Ajzen, 2020; Venkatesh and Davis, 2000; Tornikoski & Maalaoui, 2019), looks at the motivation of users to change their behaviour and accept renewal. A substantial number of implementations of innovations fail to get adopted. We assume that the presence of organisational mindfulness – a characteristic of the culture of an organisation to be discussed below - enhances the uptake of innovations by employees, as this suppresses the inclination to avoid risk-taking and strengthens the capability to respond resiliently to disappointment and mishaps (Oeij, 2018). In other words, organisational culture characteristics influence this decision process (Arts et al., 2011; Heinze & Heinze, 2020; Ober, 2020). Employee innovation adoption is the preparedness of employees to accept an innovation, that is, not only intent to use it, but also actually use it in their work. In the following paragraphs we will argue how organisational and individual behavioural characteristics will relate to employee innovation adoption. To answer

the research question about the factors that determine employee innovation we investigate four organisational and behavioural factors.

2.2 Competition strategy

Competition strategies of companies differ in the sense that on the one end a strategy can be stressing low costs at the demise of highest quality and best service, while at the other end a strategy can focus on highest quality and best service which comes at a certain price. These strategies have implications for certain organisational design aspects. A low cost strategy, for example, can coincide with a high share of flexible labour contracts, limited technological advancement, limited renewal of services and products, limited process innovations and limited investment in the training of employees, while a high quality strategy has oppositional trends regarding these elements. From the perspective of the low road versus high road strategies (Osterman, 2018) the low cost strategies can be connected to low road perspectives while high quality strategies align with high road strategies. Osterman argues that at its core the high road idea is that firms compensate employees with a wage that is “adequate,” one that is typically above the minimum the firm could get away with and still attract a workforce. This pertains that firms share their profits with employees, also in low-wage industries. Another, more encompassing, take on the high road perspective is that the quality of the job is different from the low road with regard to job content, job autonomy, learning opportunities, working conditions, and type of labour contract, which surpasses a merely economic characterisation of what is high or low. What we are stating here is that a competition strategy is not only a choice for market or price competition, but also for the type of employer one wants to present oneself. A high road profile provides better opportunities for employees to enrol in ‘active jobs’ instead of ‘passive’ and ‘simple jobs’ (Karasek, 1979). And this has repercussions for the innovative capacity of employees and their readiness to not only be receptive for innovation, but also their motivation to contribute to the creation of renewal.

Based on the previous reasoning, our first hypothesis is (see also Figure 1):

H1: A high road competition strategy is positively related to the innovation adoption by employees.

2.3 Supportive leadership

Leadership is the guiding and structuring of the work of employees to achieve organisational goals. Innovations leaders are change agents who promote the manifestation of new ideas in a work context by creating a supportive climate for creativity and managing the innovation process (Kremer et al., 2019). There are different approaches to how leadership can stimulate innovation and innovation adoption, which share similar underlying elements and need to be shortly discussed: Supportive leadership, innovation leadership, transformational leadership and distributed leadership. The similarity is that all approaches seem to associate with the engagement of employees. Supportive leadership, for example, influences the working environment of employees, and can create psychological safety and a learning orientation (Edmondson & Harvey, 2017), voice for employees (LePine and van Dyne, 2001) and both organisational and mental support (Kremer et al., 2019). Innovation leadership, is somewhat different, and is leadership that influences employees to innovate by using different styles and techniques. This type of leadership improves employee, team, and organisational creativity and innovation (Hughes et al., 2018). In this context, innovation may refer to the renewing of products, services, work processes or methods, organisational forms and employment relations and not per se to the invention of new products. Innovation leadership should eventually result in more innovation and implementation of innovation

(Gaspersz, 2013). Leadership can be directed at people but also at solving problems. Often it is about managing interactions between oneself, subordinates, peers, supervisors, clients, customers and suppliers, and intraorganisational and extraorganisational agents and events (Oeij et al., 2021). Creating trust and a space for employee voice and meaning by leaders seems critical for innovation adoption (Mitcheltree, 2021).

The literature promotes several leadership styles as conditional and supportive to innovation and to involving employees in corporate change and renewal. They have a form of employee engagement or employee involvement in common. One leadership style that promotes employee engagement is transformational leadership (Bass, 1990). Transformational leaders work with others and teams to identify needed change, creating a vision to guide the change through inspiration, and executing the change together with organisation members. Transformational leadership serves to enhance the motivation, morale, and job performance of followers. Transformational leaders are strong in their abilities to adapt to different situations, share a collective consciousness, self-manage, and be inspirational while leading a group of employees. Some contend recently that transformational leadership has a positive influence on innovation (Rezaei Zadeh et al., 2021). Conversely, transactional leadership styles are traditional, and focus on the use of rewards and punishments in order to achieve compliance from followers as it is more result oriented. The transformational style, however, can improve goals of the transactional style and make employees more productive in the end. Another leadership style is distributed leadership, or shared, democratic, or collaborative leadership. Such approaches often look at the distribution of leadership roles and are concerned with optimising the distribution of leadership so as to improve organisations. In this case, not one person per se is the leader, but in carrying out tasks the leadership role may shift among participants, as can happen in the case of teamwork, in which leaders can sometimes be followers, and followers be leaders (Spillane, 2006; Spillane & Diamond, 2007; Wang et al, 2014). The essence of transformational and distributed leadership, when it comes to innovation, is to engage employees. The presented leadership approaches show to have similarities which we shall summarise as supportive leadership in this study.

Our second hypothesis reads therefore as follows:

H2: A supportive leadership style is positively related to the innovation adoption by employees.

2.4 Organisational mindfulness

Organisational mindfulness, mindful organising or collective mindfulness (Brummans, 2017) is a concept stemming from safety and crisis management organisations to prevent disasters and failure, but has hardly been applied to the context of innovation. The concept includes being alert to weak signals for failure and to base behaviour and decisions on evidence and facts, and at the same time being able to resiliently recover from mishaps and change of direction. High Reliability Organisations, like first responders, nuclear power plants and aircraft carriers, excel in mindful organising (Tolk et al., 2015; Weick and Sutcliffe, 2015), but organisations that implement innovation, as in the logistics sector, should be successful in doing so and reduce the risks of failing to innovate. Sullivan and Yang (2016) studied the differentiated impact of organisational mindfulness (operationalised as organisational attention and learning) on different types of firm innovation, and contend that organisational mindfulness is associated with innovations. Oliver et al. (2016) found strong, significant relationships between collective mindfulness, measured by the 'Mindful Organizing Scale' (Weick and Sutcliffe, 2015) and objective measures of performance, particularly the performance of teams pursuing ambitious, high risk strategies. Earlier, Vogus and Welbourne (2003) reported that suggestive evidence that organisational mindfulness is associated with a greater number of patents, as an indicator of innovation. A meta review of resilience,

which is an element of organisational mindfulness, showed that higher alertness and resilience make teams more effective and efficient and helps them to prevent making mistakes (Alliger et al., 2015). Finally, Oeij's study of innovation teams (2018) suggests that organisational mindfulness enables resilient team behaviour in solving critical incidents and thus achieving better project results. Such mindfulness, therefore, promotes innovation.

Hence, we hypothesize:

H3: The presence of organisational mindfulness is positively related to the innovation adoption by employees.

2.5 Employee involvement

Engagement seems to refer to an organisational culture that is receptive to employees' interests, whereas involvement seems to point to employee voice in structural changes and decision making, in other words a different position on a dimensional scale of employee autonomy. This is an important distinction, because having a say in soft, intangible issues differs from having a say in hard, tangible issues, in that the first stresses symptoms and the second causes. Take as an example the way how companies deal with occupational safety and health risks. A stress management or mindfulness programme helps to combat symptoms of stress and high workloads. But having a say in changing the design of the organisation and jobs will help combat the causes of such risks. Engagement is passive agreement, while involvement implies active ownership (Boxall & Macky, 2009; 2014). In a similar vein employees can be committed to innovation to a different degree. They can either be informed about changes decided upon by management, or they can be given a role to actually (co-)decide about the nature of innovation and how it will be implemented. A position in between is that employees are consulted, but not given the right to (co-)decide. The higher the degree of commitment, the more we can evaluate that as 'involvement' and the more employees are expected to be willing to adopt innovations. In addition, we like to make clear that involvement is a relational term, related to the strategy and management philosophy of an organisation. It is easy to understand that a top down management philosophy differs from a bottom up management philosophy in the sense that the latter enables a higher level of employee involvement (Karanika-Murray & Oeij, 2017). Recent research showed that limited employee involvement is a barrier to technology adoption (Ediriweera & Wiewiora, 2021).

This line of reasoning results in our fourth hypothesis:

H4: Employee involvement is positively related the innovation adoption by employees.

2.6 Summarising the reasoning behind the hypotheses

We study factors that determine employee innovation adoption by employees in the logistics industry, and we argue that innovation adoption is dependent on organisational factors and behavioural factors. The primary organisational factor in our study is the type of competition strategy. A strategy that comes closer to a high road perspective will more enhance innovation adoption, because the employment selection process will attract employees who appreciate a job quality with learning opportunities and more responsibility. Such a strategy also affects the leadership style and working environment. Expected leadership in such contexts will nourish supportive behaviour and enable the presence of organisational mindfulness. Employee involvement is likely to flourish under such conditions. Supportive leadership and employee involvement point to behavioural factors, whereas organisational mindfulness might be best understood as a mix of organisational characteristics and organisational behaviour that has solidified into the organisational culture. Brown and Eisenhardt (1997) coined the term semi-structure for organisational features that are in between a fixed structure and a loose, if not chaotic, organisational state. We do not

know exactly how the relationships turn out to be. Therefore, from an exploratory perspective, we formulate another hypothesis:

H5: namely, that the relationship between competition strategy and supportive leadership (as an organisational feature) on innovation adoption is mediated by one or more behavioural / cultural variables (i.e., perceived organisational features), such as employee involvement and organisational mindfulness.

Figure 1 provides an overview of the five hypotheses.

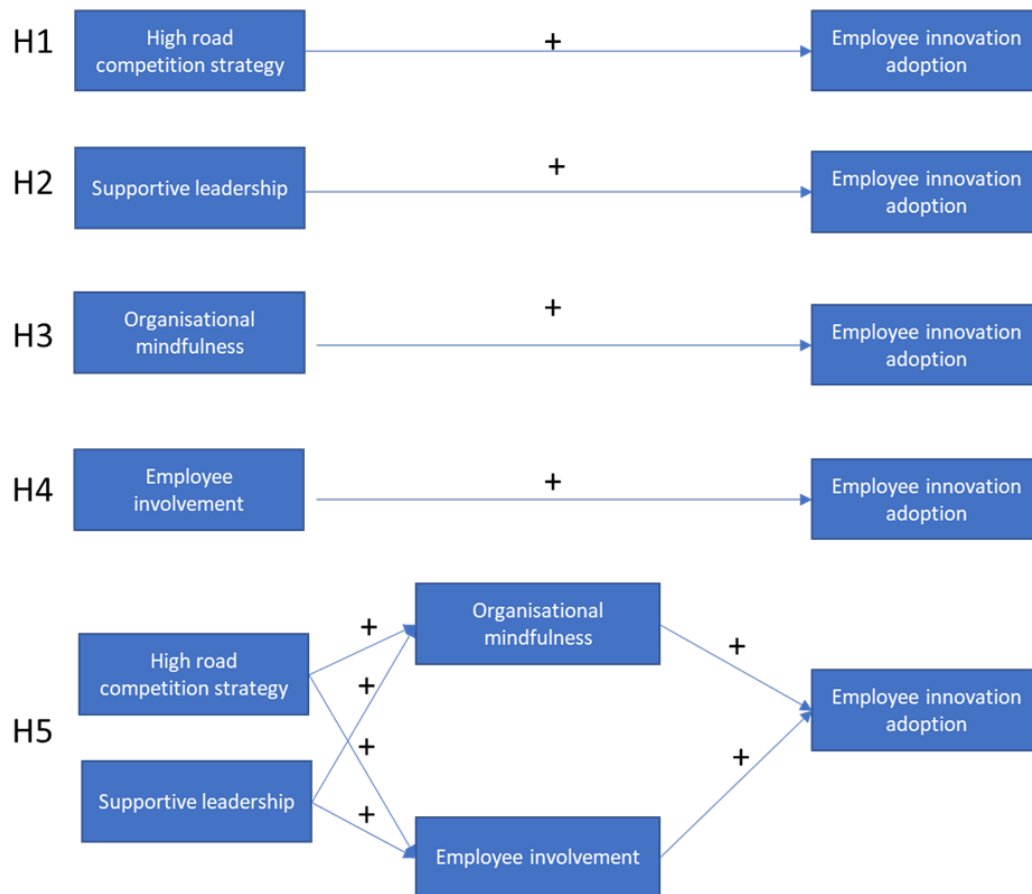


Figure 1. Theoretical framework.

3 Methods

3.1 Research activities and methodology

Grounded in the research framework of our previous studies, the purpose was to explore the factors that contribute to innovation adoption. We used and extended the survey instruments that were used in earlier studies (Putnik et al., 2019a, 2019b). These were developed based on literature research discussed above, and a pre-study of company cases. This led to a research model and the hypothesised relations between variables. For this purpose we applied regression analysis, mediation analysis and path analysis in SPSS. The pre-study of seven company case studies was carried out in 2020, who were selected on the criteria that they had recently implemented a (technological) innovation, of which we were allowed to investigate the process of innovation. In each company interviews were held with (general and HR) management and employees and/or

employee representatives. A semi-structured checklist was designed to guide the interviews, containing topics such as the nature or type of the innovation, the process of innovation, the effect of the innovation, innovation leadership, organisational conditions and workplace innovation, the relationship with suppliers and clients, and the role of employees, employee representatives (works council) and innovation adoption.

The former studies of Putnik et al. (2019a, 2019b) put the Theory of Planned Behaviour as a central building block stressing individual beliefs and attitudes of employees to determine the intention to actually use the innovation. In the present study, we developed a construct that transformed these beliefs and intentions into a set of propositions about innovation-adoption that were presented to managers. The adapted survey design shifted more to organisational aspects. The case studies indicated the importance of the economic situation of the company and its strategy whether and why they would innovate or not, and the presence of cooperation and teamwork in the innovation process seemed to be crucial for a successful implementation. The shift in the survey to include more organisational aspects implied the measurement of the competition strategy and organisational mindfulness. The cases further provided indications of the importance of supportive leadership styles and of committed employees to the renewal. These items became part of the redesigned survey questionnaire.

3.2 Data and measures

Electronic surveys were distributed in 2020 among managers of logistics companies in the Netherlands. We assumed that managers have the overview to answer questions about the firm's strategy and policy on innovation. In addition, the 'perceptions of employees' were measured by asking these managers to evaluate the behaviour of their employees. Participants were sampled from three different sources: 1) organisations that took part in the Netherlands Employers Work Survey (Dutch abbreviation WEA, <https://www.monitorarbeid.tno.nl/en-us/surveys/news/>) in 2014 and 2016 and who had agreed to be approached for future research; 2) organisations were approached via I & O Research, a research institute that manages LISA (which stands for National Job Information System and is a database containing information about all branches in the Netherlands where paid work is performed) and selected a subsample of logistics companies from LISA, 3) managers of transport and logistics organisations known to the researchers from previous research projects, and 4) internship coordinators of the intermediate vocational education institute that participated in the Sharehouse study. We asked these coordinators to distribute the questionnaire to managers of logistics companies in their network. The survey consisted of items mostly originating from validated scales. The outcomes of the research are based on these managers' perceptions of employee behaviour. In total, 123 completed surveys were returned. A link to the questionnaire has also been distributed via social media and in Logistic newsletters, for example from branch and sector organisations, which was completed by an additional seven participants. For the analyses, we excluded nine respondents whose companies did not implement an innovation in the last seven years, and 14 respondents with missing data on one or more of the independent variables. This resulted in a study population of 116 managers representing their companies.

Surveys were filled out by directors of organisations, financial or commercial managers, HR managers or technical managers who answered the questions about the situation within their organisations. Of all organisations 36% had as main activity transportation, 22% logistics and distribution, 29% 'both' and 13% 'other' (such as production and retail). The average number of employees these firms employ is 79 (median), with an interquartile range from 38 to 162 employees.

3.3 Dependent variable

Employee Innovation Adoption concerns the degree to which employees are prepared to accept an innovation, that is, not only intent to use it, but also actually use it in their daily work. A domain specific scale was constructed based on the theory of planned behaviour (Ajzen, 1991, 2020) which formed a scale ($\alpha = 0.85$), based on seven items with answering categories ranging from 1 (not at all) to 5 (fully). The operationalised items mirror the perception of the importance of innovation (for customers, one's own job), perceived effects when applied, perceived usefulness, perceived ease of use, experienced self-efficacy, perceived subjective norm, intention to use the innovation, and the actual use of the innovation. An example of an item is 'The renewals and innovations are actually picked up by the employees'.

3.4 Independent variables

Competition strategy concerns the perceived position as a competitor in comparison to one's strongest competitor. A self-constructed scale was created ($\alpha = 0.72$), based on six items with answering categories ranging from 1 (less good than my strongest competitor) to 3 (better than my strongest competitor). An example of a question is "If you compare your company with your strongest competitor on the topics below, how do you rank your company: Striving for the lowest possible labour costs". Other items are flexible labour contracts, technological lead, launching new products / services, hiring the best personnel, implementing process innovations.

Supportive leadership concerns the degree to which management offers employees the opportunity to invest in time, space and money for innovative behaviours. A scale, originating from Kraan et al. (2009), was created ($\alpha = 0.86$), based on three items with answering categories ranging from 1 (not at all) to 5 (fully). An example of the used question is "Indicate to which degree the following propositions correspond with the situation in your firm: The direct supervisor provides employees time to elaborate ideas".

Organisational mindfulness concerns the ability to discuss work errors and mistakes openly and react fast to unexpected changes, pulling on all team members' expertise, as a form of effective cooperation or teamwork. A scale was created ($\alpha = 0.84$) based on four items originating from an abbreviated version of the 'Safety Organizing Scale' of Vogus and Sutcliffe (2007), which goes back to Weick and Sutcliffe's 'Mindfulness Organizing Scale' (2015, orig. 2001). The answering categories range from 1 (not at all) to 5 (fully). The scale includes the following four items: (1) 'Team members have a good "map" of each person's talents and skills'; (2) 'Team members talk about mistakes and ways to learn from them'; (3) 'When errors happen, as team members we discuss how we could have prevented them'; (4) 'When an unexpected situation like a sudden change or project mishap occurs, as team members we rapidly pool our collective expertise to attempt to resolve it.'

Employee involvement concerns whether or not employees in operational jobs are actively consulted on innovation or improvement, which is a 'yes' or 'no' item, that is a construct of the NWO Intrapreneurship Index ISHIP (Stam, 2018). The construct assesses 'innovation' and 'workplace innovation' that together measure the involvement of employees during the innovation process.

3.5 Statistical analysis

As a first step, we calculated means, standard deviations and correlations between variables using the Pearson correlation coefficient. In a second step, a path analysis with adjustment for number of employees and main activity of the company was carried out in two stages. In the first stage, the organisational characteristics of the competition strategy and the presence of

supportive leadership were related to features of organisational behaviour, namely the presence of organisational mindfulness and employee involvement using linear and logistic regression analysis, respectively. Next, organisational mindfulness and employee involvement were related to employee innovation adoption using linear regression analysis. In the second stage, all variables (i.e. competition strategy, supportive leadership, organisational mindfulness and employee involvement) were simultaneously examined in relation to the innovation adoption of employees as the dependent variable using linear regression analysis. P-value for indirect relationships were calculated using the Sobel test (Sobel, 1986). Missing values were deleted in a listwise manner. The results are presented in the form of a path-diagram (Hayes & Rockwood, 2017).

4 Analyses and results

Table 1 shows the means, standard deviations and correlations between variables. All variables were significantly correlated to each other, except for employee involvement and competition strategy. Employee innovation adoption, the dependent variable, was in the bivariate analysis rather well related to supportive leadership ($r=.55$) and organisational mindfulness ($r=.53$), and slightly less strongly to competition strategy ($r=.40$) and employee involvement ($r=.31$). Multicollinearity was not present as the Variation Inflation Factor was below four.

Table 1. Means, Standard Deviations and Correlations between the Variables (N=116)

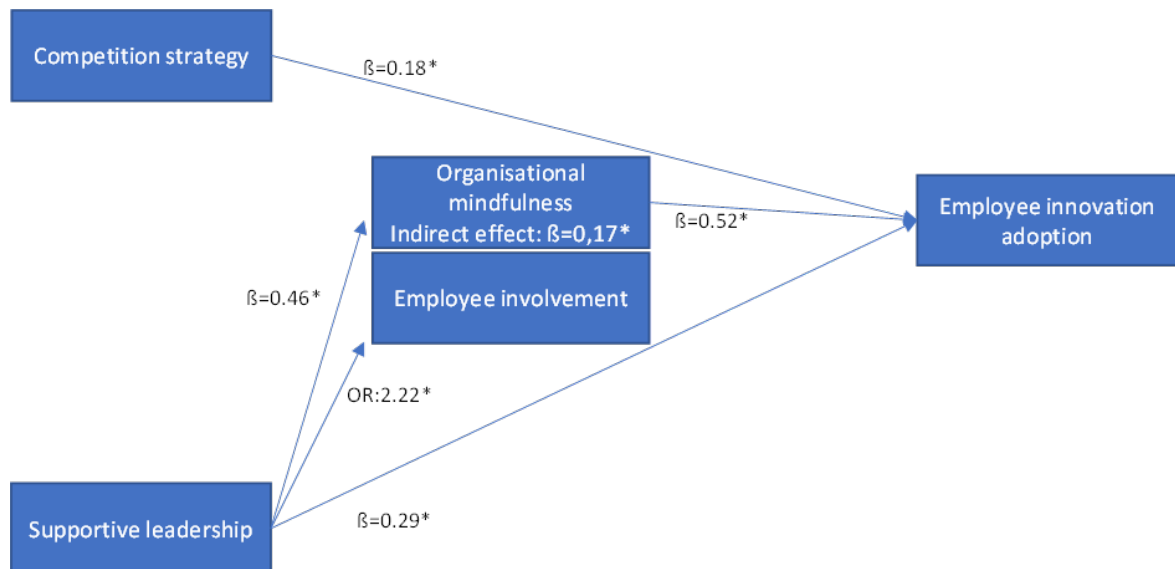
Variable	Mean (SD) or % (N)	Cronbach's alpha	1	2	3	4
1. Empl. innovation adoption	3.4 (0.6)	0.85				
2. Competition strategy	2.0 (0.5)	0.72	0.40*			
3. Supportive leadership	3.3 (0.8)	0.86	0.55*	0.37*		
4. Organisational mindfulness	3.3 (0.7)	0.84	0.53*	0.34*	0.53*	
5. Employee involvement	72% (83)	NA	0.31*	0.16	0.29*	0.32*

NA: not applicable; * $P < 0.05$

In the multivariate analyses and the resulting path analysis (Figure 2) we observe a direct positive relationship between supportive leadership ($\beta=.29$) and employee innovation adoption, and between competition strategy ($\beta=.18$) and employee innovation adoption (Appendix: Table 4). Supportive leadership was also indirectly related to employee innovation adoption via organisational mindfulness ($\beta=0.17$, Appendix: Table 5). Although supportive leadership was related to employee involvement (OR=2.22, Appendix: Table 2), there was no indirect relationship via employee involvement to employee innovation adoption as employee involvement was not directly related to employee innovation adoption (Appendix: Tables 3 and 5). Competition strategy was not related to organisational mindfulness and employee involvement (Appendix: Tables 1 and 2), nor had it an indirect relationship with innovation adoption via those variables (Appendix: Table 5). The explained variance of the final model was 40% (Adj. $r^2 = 0.40$).

5 Conclusions and discussion

In this study we examined to what extent employee innovation adoption was dependent on organisational characteristics and perceived organisational behaviour features. In this sample of Dutch logistics industry companies both organisational characteristics, namely competition strategy



β =Beta; OR=Odds Ratio; * $P < 0.05$; only significant relationships are presented in figure 2.

Figure 2. Path Analysis of work behavioral characteristics on the relationship between organisational and behavioural features and innovation adoption.

(H1) and supportive leadership, were directly related to employee innovation adoption (H2), as well as the organisational behavioural feature of organisational mindfulness (H3). Supportive leadership was also indirectly related to employee innovation adoption via organisational mindfulness (H4 and H5). But Employee involvement was not related to employee innovation adoption in the multiple regression (H4). Supportive leadership and competition strategy were not indirectly via employee involvement related to employee innovation adoption (H4 and H5).

The logistics industry is a highly competitive sector with a strong price pressure and a limited profit margin. More companies compete by lowering their costs than investing in innovation (Manpower Group, 2015). A strong competition strategy, measured as a mix of cost reduction activities and quality improvement, seems to reinforce employee innovation adoption directly. However, the competition strategy has no relation with organisational behavioural and cultural elements like organisational mindfulness and employee involvement. Perhaps such strategies are rather at a distance to the commitment of employees and their alertness to deviations in the work process, because they are not playing a role in the development of such strategies. Future research should better unravel the role of strategy and what kind of strategies not only improve innovation adoption but also involve employees into the innovation process (Greenan & Napolitano, 2021). The other organisational characteristic, supportive leadership, shows a different tack. If this is present it has a positive influence on both employee innovation adoption directly, as if it reflects the 'subjective norm' that messages the relevance of the innovation, and on the two organisational behavioural and cultural elements. In several review and meta studies leadership or management support showed to have a positive effect on innovation adoption (Mangula et al., 2017; Ober, 2020; Vagnani et al., 2019). Other researchers showed that shared leadership mediated the relationship between transformational leadership and followers' IT innovation adoption (Bunjak & Bruch, 2019). Supportive leadership apparently enables organisational mindfulness, making employees alert to deviation in the work process, and thus influence the uptake of innovation. Such leadership boosts employee involvement, but possibly not to the degree that it helps employees to adopt innovation. The possible reason why employee involvement was in the present study unrelated

to employee innovation adoption in this sample, might be caused by the fact that managers as respondents assess the role of employee involvement of their subordinates, which they possibly do not see strongly connected to the process of innovation – although there is a significant bivariate correlation between employee involvement and employee innovation adoption. Perhaps this is an indication that the involvement of employees in the process of renewal and change is simply underused, as was one of the observations during the pre-study interviews with managers. A previous study, namely, did find a relationship between employee involvement and innovation adoption in manufacturing and service firms (Rangus & Slavec, 2017). And in a more general sense, companies with a people-centred policy are more successful in innovation (Eurofound & Cedefop, 2021).

Concerning the discussion on employee innovation adoption we contend that determining factors are both organisational and behavioural variables. Organisational variables such as strategic choices about the goal of firm, technology, business model, mode of production and the division of labour affect the design of jobs of employees (Greenan & Napolitano, 2021). The subsequent organisational behaviour of managers and employees, their attitudes and motivations are influenced by these choices. Therefore, the study of employee innovation behaviour, but also the design of organisations, should take both type of variables into account.

5.1 Contributions

The contribution of this study to the domain of innovation management studies is, firstly, that we showed that there are both organisational features (strategy formation and leadership style) and behavioural features (mindful and alert behaviour of employees) that can have a positive effect on employee innovation adoption, which adds to the findings of earlier studies in the logistics industry (Putnik et al., 2019a, 2019b). Secondly, we provide distinctive information about employee innovation adoption, distinguishing this variant from innovation adoption of managers, clients and customers. In fact, employee innovation adoption seems less studied than the adoption of innovation by managers and clients and customers.

Another new insight is that competition strategies seem to have a direct effect on employee innovation adoption. The company strategy that was assessed can be interpreted as putting more weight on quality than on cost saving. A next step is to see whether such 'high road' strategies (Osterman, 2018) have a stronger effect on the innovative capability of firms than 'low road strategies'.

It is reminded that approaches like sociotechnical systems thinking (Kuipers et al., 2020) and workplace innovation (Putnik et al., 2019b), shortly mentioned in the introduction, but also adaptive structuration theory (Turner et al, 2019), stress that structural organisational conditions determine how people behave in organisations, and that this behaviour mirrors the soundness of the organisational design. A bureaucratic, centralised type of organisation with a detailed division of labour, for example, limits genuine involvement of employees and may explain the resistance to the adoption of innovation (Kuipers et al., 2020; see also Kopp et al., 2019). Our findings are in line with this reasoning.

Our findings contribute to the theory of planned behaviour (Ajzen, 2021) in the context of innovation. This theory puts a focus on how persons perceive characteristics of an innovation, namely whether an innovation when applied has positive effects for their work, if the innovation is useful and easy to use, if the employee experiences mastery when applied, and if the employee thinks that others find it important to apply the innovation. The theory could be enriched by perceptions that include measuring organisational characteristics. Apart from the competition strategy and leadership culture, one can think of how the organisations facilitates learning and

experimenting and the design of jobs and work processes that provide employees with autonomy (Karasek, 1979) and voice (Edmondson & Harvey, 2017; LePine & Van Dyne, 2001).

The findings are also an important indication that organisational behavioural concepts from safety and crisis management science, like organisational mindfulness which is rooted in the domain of organising for High Reliability (Weick & Sutcliffe, 2015), are applicable in the context of innovation management (Oeij, 2018). In both situations, either disasters or renewals, it helps to explain how employees deal with the unexpected and why this crucial for successful operations. For disasters one might say that it is hard to predict how they will evolve, but for the implementation of innovations and new technology it is less unknown how to manoeuvre with the unexpected (Van de Ven, 2017). More spill-over of High Reliability theory to the world of innovation management is recommended.

5.2 Limitations and future research

Three limitations of the study should be mentioned and could be addressed in future research. First, the research examined behaviour of employees by asking the managers about the behaviour of their employees instead of measuring employee self-evaluations. This may have caused a bias, leading to an overestimation of the relationships between supportive leadership and the other independent and dependent variables. We needed managers as respondents for the reason that employees as respondents likely have a less complete overview of strategies and operational aspects of innovation policies and activities of their own organisation. For future studies this limitation can be tackled by relying on data from multiple sources in which also employee responses are included. Another limitation of the research is its cross-sectional nature, which does not allow to make statement about cause and effect relations. Therefore, caution remains needed as causal relationships could not be inferred. Future research should, in the second place, design longitudinal research to examine the causal nature of the relations between the independent variables and innovation adoption. We underline the importance of research designs that allow to study the process character of innovation adoption, namely the phase of initiation, decision-making and implementation, and the processual character of individual decision-making, which involves a time sequence of perceptions, intentions and behaviours that either lead to adaptation or rejection. Finally, “retrospective innovation characteristic studies are particularly suspect” to bias, because “one would expect raters of an innovation’s characteristics to rate the innovation favorably once they had adopted it”, therefore “most retrospective data gathering approaches are likely to give a distorted view of ‘prediction’”, said Tornatzky and Klein already in 1982. Thus, respondents in our retrospective study may also have overestimated innovation adoption and related characteristics.

5.3 Recommendations for practice

Why would employees adopt innovation? The literature tells us that employees intend to participate in innovation when changes will have an effect on their jobs, job security, income security and professional identity. In a review of the literature, Greenan and Napolitano (2021) state that technological transformation is the result of organisational choices. Managers, leaders and decision makers have an opportunity to design such transformations in ways that create work environments that favour innovative work behaviour and enable employees to engage their resources by participating in innovation. In other words, employee innovation adoption can be influenced.

Recommendations for practice, especially for logistics companies and companies from related industries, such as manufacturing, are the following:

- 1) Innovation adoption is crucial to remain competitive. Obviously, appropriate competition strategies are the right answer to market turbulences. Besides the deployment of the right

competition strategies to improve innovation adoption, organisational behavioural interventions should also be implemented to speed up the uptake of renewal. One of these interventions is to develop organisational mindfulness, which can be nurtured by creating trust, psychological safety and a learning culture (Edmondson & Harvey, 2017) and train employees in being mindful about possible mishaps and mistakes (Weick & Sutcliffe, 2015; Slagmolen et al., 2017).

2) Supportive leadership is a relevant organisational feature that helps innovations to get adopted by employees. This aligns with the discussed programs on social and organisational innovation in the logistics industry, but seems broader applicable than to the Dutch logistics industry. Such innovations probably contribute to the embedment of technological innovations and other types of renewal. Leadership may also relate to setting the example for others that innovation is important to the firm, as is explained by the 'subjective norm' of the Theory of Planned Behaviour (Ajzen, 1991). The subjective norm refers to the perception of employees that their supervisors and co-workers deem innovation important, and when employees regard them as 'significant others' they will become susceptible to copying their behaviour and opinions. Developing similar leadership styles, such as transformational and distributed leadership, will create an organisational culture which likely nourishes mindful and creative behaviour through innovation adoption, and the uptake of more challenging tasks by employees, which enhances innovative work behaviour (Preenen et al., 2016).

3) While employee involvement plays no obvious role in this specific sample, there is much research that provides evidence for the fact that employee involvement and employee engagement stimulate creativity and innovation, and also better productivity and job satisfaction (Boxall & Macky, 2009, 2014). Partly due to the dominance of traditional employment relationships and management styles (Manpower Group, 2015), perhaps the logistics industry is underusing its potential to commit their employees to the process of innovation.

These recommendations are rooted in the conviction that decision makers in organisations, often managers, have the strategic choice how the firm should be managed and how the work process and the content of jobs are to be designed (Child, 1997; Edmondson & Harvey, 2017; Karasek, 1979). Markets and other externalities surely cause limitations to the room to manoeuvre. But leaving the potential of employees for innovation unused is an avoidable entrepreneurial risk if one takes the turn for the High Road (Osterman, 2018).

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Appendix 1. Path analysis and indirect effects

STAGE 1: Presents logistic and linear regressions between the variables *Competition Strategy* and *Supportive Leadership* in relation to the intermediate-variables *Organisational Mindfulness* (Table 1) and *Employee Involvement* (Table 2); subsequently it presents linear regressions between the variables *Organisational Mindfulness* and *employee involvement* in relation to the dependent variable *Employee innovation Adoption* (Table 3).

Table 1. Linear regressions between competition strategy and supportive leadership in relation to organisational mindfulness.

	Unstandardised coefficient		Standardised coefficients	Confidence intervals	Significance (P-value)
	B	SE	Beta		
Competition strategy	0.22	0.12	0.15	-0.042 – 0.46	0.07
Supportive leadership	0.41	0.07	0.46	0.26 – 0.56	<0.0001

**adjusted for size and main activity of organisation.*

Table 2. Logistic regressions of competition strategy and supportive leadership in relation to employee involvement.

	Unstandardised coefficient		Odds ratio	Confidence intervals	Significance (P-value)
	B	SE			
Competition strategy	0.19	0.47	1.21	0.48 – 3.04	0.69
Supportive leadership	0.80	0.31	2.22	1.21 – 4.07	0.01

**adjusted for size and main activity of organisation.*

Table 3. Linear regressions of organisational mindfulness and employee involvement in relation to employee innovation adoption.

	Unstandardised coefficient		Standardised coefficients	Confidence intervals	Significance (P-value)
	B	SE	Beta		
Organisational mindfulness	0.42	0.07	0.52	0.29 – 0.56	<0.0001
Employee involvement	0.19	0.11	0.15	-0.02 – 0.41	0.08

**adjusted for size and main activity of organisation.*

STAGE 2: Presents a linear regression model between all the variables in relation to the dependent variable *Innovation Adoption* (Table 4).

Table 4. Linear regressions between all organisational and behavioral features, and employee innovation adoption.

	Unstandardised coefficient		Standardised coefficients	Confidence intervals	Significance (P-value)
	B	SE	Beta		
Competition strategy	0.21	0.09	0.18	0.02 – 0.39	0.03
Supportive leadership	0.21	0.07	0.29	0.08 – 0.34	0.001
Organisational mindfulness	0.26	0.08	0.31	0.11 – 0.40	0.001
Employee involvement	0.13	0.10	0.10	-0.07 – 0.33	0.19

**adjusted for size and main activity of organisation.*

Table 5. indirect effects of competition strategy and supportive leadership with employee innovation adoption via organisational mindfulness and employee involvement.

	Organizational Mindfulness			Employee Involvement		
	Standardised coefficients	SE	Significance (p-value)	Standardised coefficients	SE	Significance (p-value)
Competition strategy	0.09	0.05	0.08	0.04	0.09	0.69
Supportive leadership	0.17	0.04	<0.0001	0.15	0.11	0.15

Adjusted for size and main activity organization and employee involvement. P-value calculated using the Sobel test.

Biographies



Peter R.A. Oeij. Dr. Peter Oeij is senior researcher at TNO, Netherlands Organisation for Applied Scientific Research. He holds masters in sociology, history and psychology and a Ph.D. in Organisation Science. Peter carries out research and consultancy in the field of innovation management, workplace innovation and team dynamics in national and European projects. Preceding his affiliation to TNO, Peter worked for a social science research institute on labour issues, established at Tilburg University in The Netherlands.

CRediT Statement: Supervision, Conceptualization, Study design, Co-analyzing, Writing the original draft, Revision.



Gerben Hulsegge. Dr. Gerben Hulsegge is a researcher at TNO, Netherlands Organisation for Applied Scientific Research. He holds a Ph.D. in Health Sciences, and worked preceding his affiliation to TNO as a post-doc researcher in the Department of Public and Occupational Health of the Amsterdam UMC. Gerben carries out research in the field of workplace innovation, impact of technology on organisations, management, and employees, as well as diversity & inclusion in the workplace. He strives to translate research into practical knowledge and interventions that benefit employees, organisations and society.

CRediT Statement: Conceptualization, Study design, Data analysis, Co-writing the original draft, Remarks and suggestions.



Paul T.Y. Preenen. Ph.D. in Organizational Psychology. He loves doing research on intrapreneurship, social innovation and impact of technology for organizations, management, and employees. Paul gained (inter)national policy advising and technology matchmaking experience working for the Netherlands Trade Office in Taiwan, the Ministry of Finance, and the Ministry of Infrastructure and the Environment. His work has been published in both international academic and professional journals, and has been discussed in (inter)national media outlets. He's advisory member for several committees, among which the Dutch Social Economic Council (SER). Paul always seeks for creative solutions, cooperation and synergy. Someone who enjoys translating research into practical knowledge and interventions that benefit both employees, organizations and society.

CRediT Statement: Supervision, Conceptualization, Correcting the original draft, Remarks and suggestions.



Guy Somers. Guy Somers MSc is project manager and researcher at Fontys University of Applied Sciences. He holds a master in supply chain management. His research is mainly focusing on warehouse innovations, intermodal transport and logistics innovation within small and medium sized logistics companies. On these themes he initiated and managed externally funded research projects. His key strength is to make the connection between scientific research on the one hand and application of these concepts in practice at logistics companies on the other hand. His work has been presented at international conferences and published in professional journals.

CRediT Statement: Correcting the original draft, Remarks and suggestions.



Menno Vos. Dr. Menno Vos is professor at Windesheim university of Applied Sciences. Menno Vos received his Ph.D in organizational psychology in 2009. His research focuses on the mechanisms of lifelong learning on a micro (individuals), meso (organizational) and macro (interorganizational) level. Research topics include: self-directed development, learning oriented leadership, inter-organizational learning, skills of the future. Furthermore, his expertise lies on the transition between education labor market in the tech and logistics sector. On these themes he initiated or managed several externally funded multi stakeholder research projects, in which educational institutions (middle and higher vocational) and private partners (companies, sector organizations) are actively involved. His work has been published in both (inter)national academic and professional journals.

CRedit Statement: Conceptualization, Correcting the original draft, Remarks and suggestions.