

Innovation adoption of employees in the logistics sector in the Netherlands: The role of workplace innovation

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Abstract

In this study we examine individual behavioural and organisational predictors of innovation adoption among employees in the transport and logistics sector in the Netherlands. The framework of the study is based on theories of planned behaviour and workplace innovation. Based on a survey of 224 respondents, we see that employees who are expressing innovative behaviour, are feeling engaged in the process of innovation development and implementation and are stimulated to contribute in the team or department's meetings, also have a positive perception of innovation. Ease of use and subjective norm are key elements related to the actual use of innovation, i.e., innovation adoption. The role of workplace innovation, that is engagement of employees in decision making and giving them voice in the process of innovation development and innovation, is highly relevant for successful implementation of innovation.

Keywords: workplace innovation; innovation adoption; theory of planned behaviour; logistics; employee engagement

Introduction

In order to remain economically competitive and to keep up with societal demands, organisations are implementing various technological and process-oriented innovations. For innovations to have their maximum effect these should also be well co-adopted by the workforce. Yet, little is known about combined organisational factors and individual employee behaviour that influences innovation adoption of employees.

Indeed, several theoretical frameworks have examined human behaviour related to technology acceptance as part of the innovation process in the past, for instance the *Technology acceptance theory* (Davis 1989; Bagozzi, Davis & Warshaw 1992; Mun, Jackson, Park & Probst 2006), and the *Innovation diffusion theory* (Rogers 2003). Yet, these theories rather focus on technological innovations, individual factors and the process as a whole with regard to innovation adoption, rather than on organisational and employee factors as predictors of innovation adoption.

We believe the approaches of *Leadership* (Yukl, 2012; Oeij, Gaspersz, Van Vuuren & Dhondt 2017) and *Workplace innovation* (De Sitter, den Hertog & Dankbaar 1997; Pot, Rus & Oeij, 2017) may help to understand the relationship between employee and organisational factors, and innovation adoption. Workplace innovation focuses on organisation of work as a form of innovation and employee participation, with the objective of improving both quality of work and organisational performance (Pot, Rus & Oeij 2017). It refers to non-technological interventions of an organisational nature and regarding the deployment of personnel, that support embedding and adopting technological innovation (Oeij & Dhondt 2017). Workplace innovation is a means to improve quality of jobs and company performance by such interventions. Workplace innovation therefore complements technological innovation and is necessary for socio-organisational renewal. In addition to the two mentioned frameworks, in this study we use elements of the *Theory of planned behaviour* (Ajzen 1991, 2012; Fishbein and Ajzen 1975, 2010), as a validated concept for behavioural change, as we wish to understand the role of perception of innovation for actual use of innovation. We combine these theories into a research model and investigate the main relations in the current study.

In sum, the aim of this study was to explore the role of workplace innovation for perception of innovation by employees, and eventually, innovation adoption by these employees. With these insights we want to assess its implications for further theorising on workplace innovation.

Our article starts with presenting theoretical points of departure resulting in the conceptual model of innovation adoption and the formulation of our hypotheses. We continue by describing the methods and the results we found. In the conclusion we address the hypotheses and thereafter we mention issues for discussion and some implications for practice.

Individual behaviour and innovation adoption

Adoption is the decision to proceed with the implementation of a practice: here accepting to work with an innovation, which is a complex process, as it includes factors at both the organisational and individual level (Wisdom, Chor, Hoagwood & Horwitz, 2014). The *Theory of planned behaviour* (Ajzen 1991; Fishbein & Ajzen 1975) explains that individual behaviour is preceded by intentions to perform that behaviour. These intentions are determined by the individual's motivation driven attitudes, and perceptions (of employees) about opinions of influential others, and one's self-assurance to perform well. Fishbein and Ajzen (1975) operationalise these determining factors as respectively behavioural attitudes, subjective norms and self-efficacy. The *Theory of planned behaviour* is a general theory that needs to be made context specific, here to the context of employees adopting innovations or new technologies.

According to the *Technology acceptance theory*, the motivation or intention to adopt a new technology, i.e., an innovation, is driven by the perceived usefulness of an innovation (benefit) and its perceived easiness in use (user

friendliness) (Bagozzi et al, 1992; Davis 1989; Mun et al 2006). The first, perceived usefulness, refers to the expectation that the innovation will improve one's performance, based on the individual's evaluation of the new technology as relevant for the performer's output (quality judgment), and to enable application of the new technology to specific tasks (relevance). In addition, a user needs to be able to assess or observe that applying a technology is indeed successful (result demonstrability), for example by watching others using it (Rogers 2003; Venkatesh & Davis 2000). The second, perceived easiness, is intertwined with a person's self-efficacy or self-assurance to apply the new technology. Apart from usefulness and easiness of an innovation, subjective norms (for example opinions of managers, as significant others, about importance of use of innovation) determine the intention to apply and adopt innovations. The subjective norm may induce individuals to conform their behaviour into the desired direction (Ajzen 1991; Fishbein and Ajzen, 1975; Venkatesh, Morris, Davis & Davis 2003; Venkatesh & Davis 2000).

Organisational context

While individual factors are assumed to be important for employees to adopt innovation, certain organisational conditions are more favourable than others, especially those environments that stimulate employee engagement and participation (Totterdill & Exton 2017). A first clear building brick for employee engagement is job autonomy (Karasek 1979; Karasek & Theorell 1990), the decision latitude about how one selects and executes tasks to be performed during the production or servicing process. Job autonomy is a feature of 'active jobs' that are designed to have controllable workload levels (to maintain acceptable stress levels) and learning opportunities to fully deploy one's talents (challenging tasks) (De Sitter et al. 1997; Dhondt, Pot & Kraan 2014; Karasek & Theorell 1990). Job autonomy can be relevant to guide one's behavioural intentions and has been in earlier studies positively related to company performance (Preenen, Oeij, Dhondt, Kraan, Jansen et al. 2016). The working environment of employees can propel openness to renewal when, as a second determinant, there is employee voice, and a psychologically safe surrounding that allows making mistakes and learning (De Dreu 2002; Edmondson 2012; Oeij 2018), which is especially important for first-line personnel to feel invited to express their opinions (Weick & Sutcliffe 2007). In such environments, employees will feel more freedom and less pressure for new behaviours, like adopting a new technology. A third aspect of the organisational context is how employees perceive leadership of their management. When it comes to introducing innovation, management should engage, stimulate and support others, especially in the case of differing interests, possible conflicts and ambiguity, to which the introduction of newness is conducive (Oeij, Gaspersz, Van Vuuren & Dhondt 2017; Totterdill & Exton 2017; see also Nusair, Ababneh & Kyung Bae 2012). In such instances, leadership should not only be transactional: directed at task execution and results, but also transformational, inspirational, (Yukl 2012), and synergetic, in that it can deal with conflicting goals and complexity (Lawrence, Lenk & Quinn 2009). Management that can effectively deal with innovation as a complex process with several ambiguities and possible conflicts of interest (Van de Ven 2017), will be an example for employees that helps to accept newness, and will also be internalised as a subjective norm that innovation is important.

Domain specific behaviours and facilitating measures

Apart from organisational and individual factors that determine innovation adoption or the actual use of innovation, domain specific behaviours of employees are expected to accelerate the uptake of newness. Intrapreneurship points to opportunities that employees see, use and improve the innovation and performance of companies (Carrier 1994). An element of intrapreneurship is innovative behaviour, i.e., initiating and introducing new ideas, processes, products and procedures (Farr & Ford 1990). Innovative behaviour is expected to positively affect innovation adoption.

The former discussion has led to the following conceptual model of innovation adoption which has been applied in this research (see Figure 1). The model depicts how employees perceive the work environment in terms of characteristics of the organisational context. This factor, and the individual features of employees, i.e. their attitude regarding innovative behaviour, are elements of workplace innovation. As such these are thought to affect how employees perceive the innovation itself and whether they will actually use it. From previous research on innovation adoption of employees, we saw that workplace innovation (defined in terms of high autonomy, high team voice and engagement of employees with operational tasks in innovation process) was directly related to actual use of innovation (Putnik, Oeij, Dhondt, Van der Torre & de Vroome 2019). Important to note is that in the mentioned study managers evaluated innovation adoption of their employees (indirect measurement of innovation adoption). Furthermore, innovative behaviour was related to perception of innovation and perception of innovation (usefulness of innovation and ease of use of innovation) was directly related to use of innovation. In this study we wished to explore the relations in our model based on the employees of the logistics sector, to see if there is similarity in findings when concepts are measured directly from employees, versus when they are measured indirectly, via the perception of managers, as well as reflect on findings in relation to theory and previous research.

The main research question of this study is: *Which individual and organisational factors are related to the perception of innovation of employees in logistics, and how does this relate to the actual use of innovation by employees in organisations?*

Hypothesis 1 is: The more stimulating the organisational context (autonomy, team voice, employee engagement), and the more innovative the behaviour of employees, the more positive the perception of innovation.

Hypothesis 2 is: Positive perception of innovation (result demonstrability, usefulness, ease of use, subjective norm) is related to higher innovation adoption (actual use of innovation).

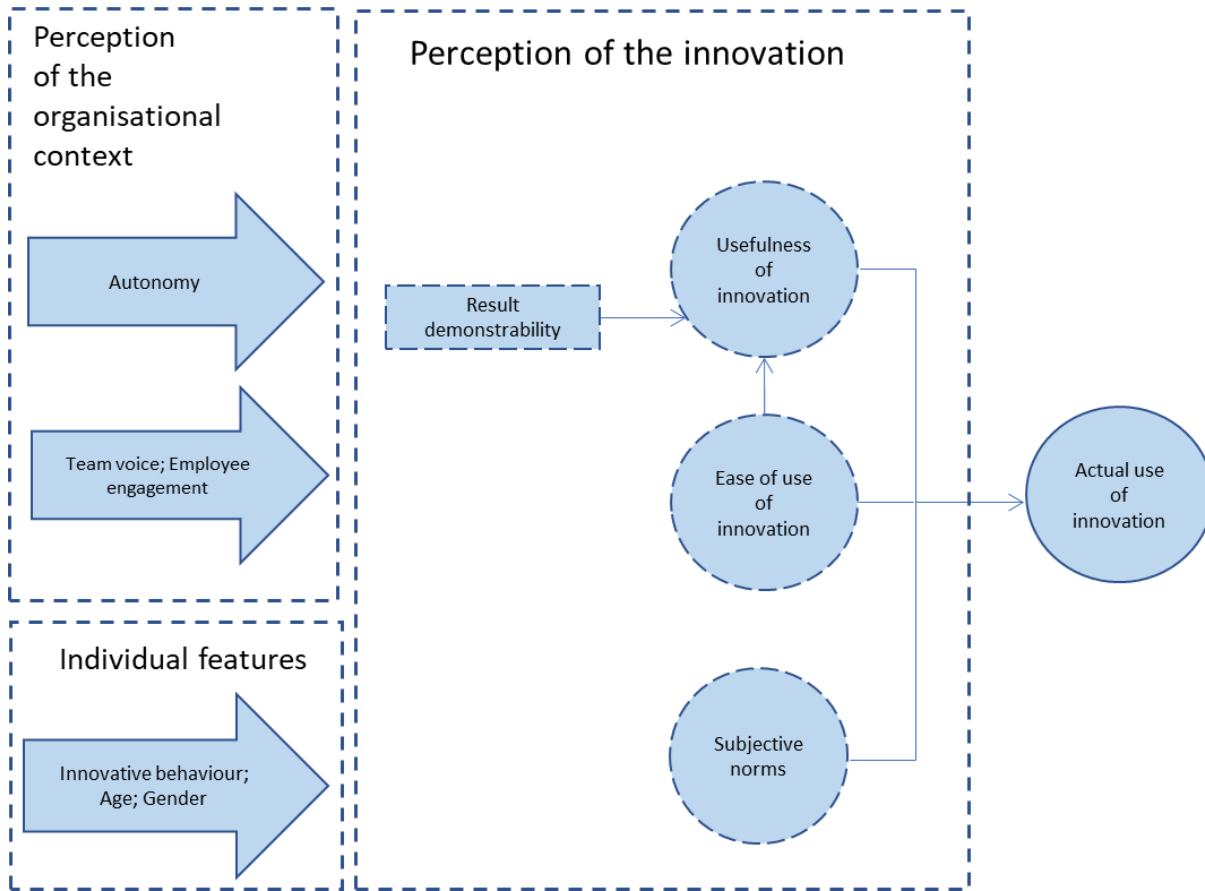


Figure 1. Conceptual model of innovation adoption.

Methods

Measures and data

Electronic surveys were distributed via e-mail in the months of May and June 2018. The sample was drawn from the Netherlands Working Conditions Survey (NWCS), cohort 2017, which is a large representative sample of the working population of the Netherlands (Hooftman, Mars, Janssen, de Vroome, Janssen & Ramaekers 2018). All employees working in the transport and/or logistics sector who gave permission to be approached again, were contacted (n=985). Via an email the announcement about the survey and its purpose were communicated. Following this mail, we received a number of notifications of faulty e-mail addresses, information that employees were not interested in participating, or were not anymore employed. Eventually, 830 employees were approached with the survey. Our purpose is not to assess representative knowledge for the logistics sector employee population, but to explore our theoretical model.

All employees received two reminders to fill out the survey. The response rate was 27% (n=224). The younger employees are underrepresented in the survey (5%=18-28 years old and 15%=28-38 years old). In our sample, 81% of respondents are male and 19% are female. The participants work mostly in the transport sector (54%), followed

by the logistics sector (21%), and both logistics and transport sector (25%). The employees' main function could be described as mostly operational (66%), managerial (15%), supportive (13%) and preparatory tasks (6%). Twenty nine percent of employees work in organisations that have not implemented an innovation in the past two years. The remaining 71% of organisations introduced a new product (28%), service (38%), new work process (69%), new organisation of work (39%), innovative use of personnel (38%) or other types of innovation (9%). Some organisations implemented two or more innovations in the last two years.

Dependent variable:

Actual use of innovation was measured with a self-constructed item: *'I use innovations well'*. Answering categories ranged from 1 (not at all) to 5 (fully). The variable was dichotomised, so that answer categories 1 to 3 were defined as low actual use (value 1), and 4 to 5 as high actual use (value 2).

Independent variables:

Perception of the organisational context:

Organisational variables concern the context in which work is carried out. We operationalised this with the variables of *Autonomy*, *Team voice*, and *Employee engagement* concerning innovation.

Autonomy concerns the degree to which employees can determine the way in which work is carried out. A mean sum score was created ($\alpha=0,78$) based on six items with three answering categories (1=no, 3=yes, regularly, originating from the NWCS (Hooftman et al. 2018). An example of an item is: *'Can you decide yourself how you carry out your work?'*

Team voice concerns the extent to which employees feel free to express their opinions. A mean sum score was created ($\alpha=0,93$) based on six items with answering categories ranging from 1 (fully disagree) to 5 (fully agree), originating from a survey of LePine & Van Dyne (2001). An example of the item is: *'Every employee freely shares his or her ideas for new projects or changes in the way work is carried out'*.

Engagement of employees concerning innovation (Employee engagement) was measured with a seven-point answering scale, consisting of six items (NWO Intrapreneurship index: Fleischer & Stam 2018; Stam 2018, which includes a subscale of Workplace innovation). A mean sum score ($\alpha=0,87$) was created, where two of the original six items were removed, due to their poor reliability. An example of an item is: *'I am approached to give input about innovation and renewals.'* Types of innovation included: innovation of a product; innovation of a service; innovation of a working process/ICT support; innovation in organisation of work; innovative use of personnel; other types of innovation; no innovation.

Individual features:

By *individual features* of employees, we mean domain specific attitudes concerning innovation, as well as their individual characteristics, such as age (age in years) and gender (male, female, other). *Innovative behaviour* is one of the Individual features that we have measured. The mean sum score ($\alpha=0,97$) was created, originating from the *Intrapreneurial Behaviour Measurement* questionnaire (Preenen, Liebrechts, Dhondt, Oeij & Van der Meulen 2014) and contains nine items, measured on a five-point scale (1=never, 5=always). An example of the item is *'I clearly contribute to improving products/services of the organisation'*.

Perception of innovation:

Perception of innovation was measured with four items: 1) *Visibility of results* (item: ‘The effects of using the innovation are clearly visible to me’, Fleuren, Paulussen, Van Dommelen & Van Buuren 2014); 2) *Perceived usefulness* (item: ‘I perceive the innovation as useful, for myself or for clients’, Venkatesh & Davis 2010); 3) *Perceived ease of use* (item: ‘The ease of use of innovation is high, both myself and clients’, Davis 1989), and 4) *Subjective norm* (item: ‘The management communicates regularly to me about the importance of innovation’, Venkatesh et al. 2003; Venkatesh & Davis 2000). Answering categories for all four items ranged from 1 (not at all) to 5 (fully).

Analyses

As preparatory analyses, in order to rule out the possibility of multicollinearity, we carried out correlation test for the variables in our model. We then proceeded by carrying out independent samples t-test to compare organisations high in innovation adoption (actual use of innovation) and those low in innovation adoption (low actual use of innovation). Lastly, in order to answer our research question, a path analysis based on multiple regressions was carried out in two stages (Figure 2). In the first stage, organisational context (*Autonomy, Team voice, engagement of employees concerning innovation*) and individual features (*Innovative behaviour, Age, Gender*) were simultaneously examined in relation to the perception of innovation (*Result demonstrability, Usefulness of innovation, Ease of use of innovation, and Subjective norm concerning innovation*). In this stage four regression analyses were carried out, where each variable of perception of innovation was used as an outcome variable and organisational and individual features as independent variables. In the second stage, all variables in the model were simultaneously examined in relation to the actual use of innovation as the final dependent variable. In total, we performed five multiple regression analyses consecutively, but we present the results in one visualized solution in Figure 2 as a path-diagram (Hayes & Rockwood 2017). This path analysis was conducted to investigate the process of how different elements of the research model work in practice. Missing values were deleted in a listwise manner.

Results

Actual use of innovation has a significant positive correlation with *Engagement of employees* and all four variables of *Perception of innovation* (Table 1, based on listwise deletion). The strongest correlations of actual use of innovation are with the *Usefulness of innovation* variable, which is part of the *Perception of Innovation*. Overall, the strongest correlations are between *Ease of use* and *Usefulness of innovation* and between *Engagement of employees* concerning innovation and *Subjective norm*. The high correlations are in line with the theoretical predictions.

Table 1: Means, standard deviations and correlations between the variables

	M	SD	Gender	Age	Autonomy	Team voice	Innovative behaviour	Employee engagement	Result demonstrability	Ease of use	Usefulness of innovation	Subjective norm	Actual use
Gender (1=male,2=female)	1,19	,39	1										
Age	49	12,07	<i>+0,19</i>	1									
Autonomy (1-3)	2,16	,55	<i>+0,06</i>	<i>-0,07</i>	1								
Team voice (1-5)	2,89	,89	<i>-0,01</i>	<i>-0,03</i>	<i>+0,17</i>	1							
Innovative behaviour (1-5)	2,49	,99	<i>-0,16</i>	<i>+0,02</i>	<i>+0,20</i>	<i>+0,50</i>	1						
Employee engagement (1-7)	3,15	1,39	<i>+0,01</i>	<i>+0,11</i>	<i>+0,30</i>	<i>+0,45</i>	<i>+0,52</i>	1					
Result demonstrability (1-5)	3,33	1,11	<i>-0,09</i>	<i>+0,15</i>	<i>+0,01</i>	<i>+0,23</i>	<i>+0,40</i>	<i>+0,51</i>	1				
Ease of use (1-5)	3,57	,98	<i>-0,18</i>	<i>-0,16</i>	<i>+0,15</i>	<i>+0,21</i>	<i>+0,30</i>	<i>+0,37</i>	<i>+0,41</i>	1			
Usefulness of innovation (1-5)	3,12	1,14	<i>-0,16</i>	<i>-0,01</i>	<i>+0,03</i>	<i>+0,30</i>	<i>+0,35</i>	<i>+0,38</i>	<i>+0,45</i>	<i>+0,61</i>	1		
Subjective norm (1-5)	2,79	1,18	<i>+0,04</i>	<i>+0,03</i>	<i>+0,18</i>	<i>+0,50</i>	<i>+0,50</i>	<i>+0,67</i>	<i>+0,40</i>	<i>+0,30</i>	<i>+0,29</i>	1	
Actual use of innovation (1=low; 2=high)	1,59	,49	<i>+0,16</i>	<i>+0,10</i>	<i>+0,03</i>	<i>+0,11</i>	<i>+0,17</i>	<i>+0,34</i>	<i>+0,39</i>	<i>+0,34</i>	<i>+0,44</i>	<i>+0,35</i>	1

Note: *italics* represents significant results $p < 0,05$.

In Table 2 (based on the 137 remaining cases) we compared the groups of low and high actual use of innovation and tried to see if the groups differed significantly on the main work dimensions identified in this study. . For the majority of employees, innovation adoption was high (59%). Employees with high innovation adoption differ on a number of aspects from employees who are low in innovation adoption (41%): employees with high innovation adoption have a greater say in their work environment (*Team voice*), show more *Innovative behaviour*, are more engaged in the innovation implementation (*Employee engagement*) and perceive innovation in a more positive light. They see the innovation as bringing more tangible results, being easier to use and more useful to apply and perceive greater support of management to use the innovation than employees with low innovation adoption. There were no significant differences between the employees with high and low innovation adoption when it comes to age, gender and degree of autonomy.

Table 2. Comparison of individuals according to low actual use of innovation vs high actual use of innovations

	N (%)	Actual use of innovation		
		Low (1)	High (2)	Total
		56 (41%)	81 (59%)	137 (100%)
Gender				
1 Male		83,9%	79,0%	81,0%
2 Female		16,1%	21,0%	19,0%
Age [mean]		50 years	49 years	49 years
Autonomy [Score: 1–3]		2,17	2,25	2,22
Team voice [Score: 1–5]		2,78*	3,15	2,99
Innovative behaviour [Score: 1–5]		2,38*	2,81	2,63
Employee engagement [Score: 1–7]		2,61*	3,56	3,17
Result demonstrability [Score: 1–5]		2,88*	3,69	3,35
Usefulness of innovation [Score 1–5]		3,18*	3,86	3,59
Ease of use [Score: 1–5]		2,56*	3,51	3,12
Subjective norm [Score: 1–5]		2,32*	3,17	2,82

Note: * represents significant results $p < 0,05$. Total number of employees is less than 224, as 64 organisations did not carry out any innovation and 23 employees had missing values on at least one of the examined variables. (NB the mean scores differ from Table 1 due to the changed N).

Results of the path analysis are summarised in Figure 2. Hypothesis 1 ‘The more stimulating the organisational context, and the more innovative the behaviour of employees, the more positive the perception of innovation’ was partially confirmed. The hypothesis holds for *Team voice*, *Innovative behaviour* and *Engagement of employees*. Employees who feel free to give input to their department or team, experience higher subjective norm concerning the importance of use of innovation. Employees who show more innovative behaviour, also perceive higher results demonstrability by use of innovation. The higher the engagement of employees during the innovation implementation phase, the higher the positive perception of innovation in terms of demonstrability of result, usefulness and ease of use of innovation and subjective norm. Autonomy has no significant relation with perception of innovation.

Hypothesis 2 ‘Positive perception of innovation (result demonstrability, usefulness, ease of use, subjective norm) is related to higher innovation adoption (actual use of innovation)’ was also partially confirmed. Two aspects of perception of innovation, namely, *Ease of use* and *Subjective norm* are positively related to the innovation adoption (*Actual use of innovation*). Two other aspects of perception of innovation, that is, *Result demonstrability* and *Usefulness of innovation* did not appear to play a role for innovation adoption.

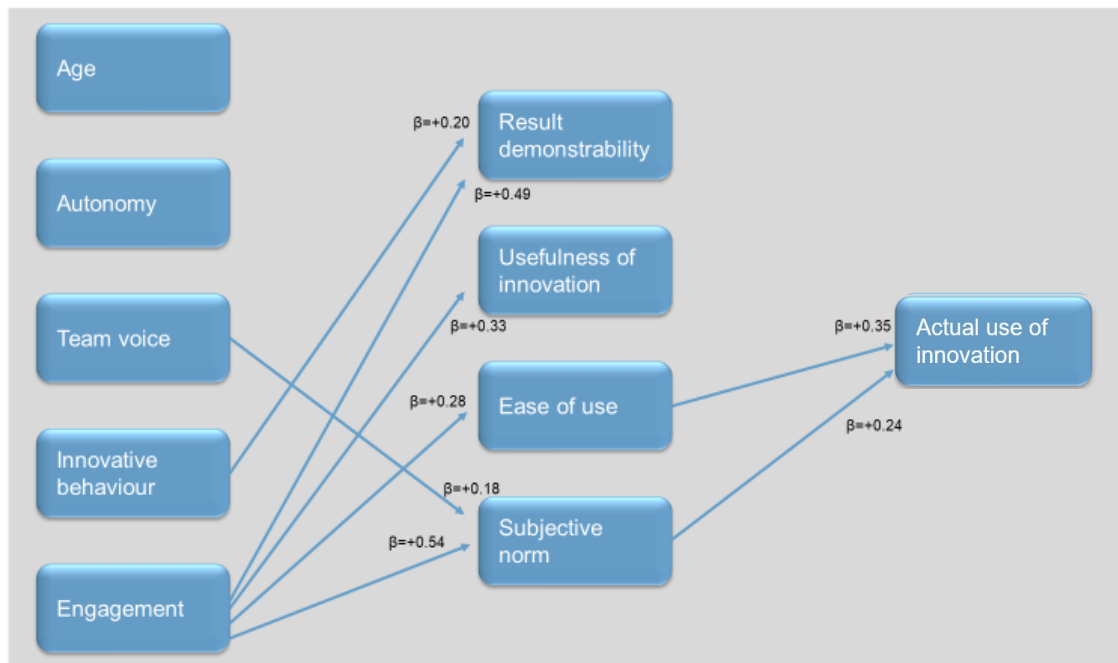


Figure 2. Path analysis for ‘Actual use of innovation’ as outcome variable.
 Note: All depicted relationships are significant (* $p < 0,05$).

Conclusion

This study aimed to examine which organisational and individual factors, as well as elements of perception of innovation, play a role in innovation adoption process at the level of individual workers. Based on the findings, we conclude that four elements are a key to successful innovation adoption: 1. team voice and 2. engagement of employees, 3. ease of use and 4. subjective norm. Team voice and engagement of employees are positively related to ease of use of innovation and seeing the importance of the use of innovation (*Subjective norm*), which in turn are positively related to actual use of innovation.

From this research, we conclude that certain organisational aspects of workplace innovation, as defined by team voice and engagement of employees, are important for successful implementation of innovation. Employee engagement is a determining constituent of workplace innovation (Oeij & Dhondt 2017; Totterdill & Exton 2017). Not surprisingly, there is however a strong correlation with team voice as there is some theoretical overlap between these concepts. But more relevant is the observation that employee engagement has an influence on all four elements of the ‘planned behaviour’ of employees (four perception of innovation variables: result, use, ease and norm) to actually use the innovation. As such, workplace innovation largely determines the uptake of renewal, i.e. innovation adoption. Finally, autonomy played no role in the multivariate analysis in relation to perception of innovation or innovation adoption among employees.

Discussion

The general assumptions of our theoretical model (Figure 1) have been supported: both organisational and individual aspects are determining innovation adoption. Organisational context (in the form of team voice and

employee engagement) and individual variables (innovative behaviour) are related to perception of innovation, while perception of innovation (ease of use and subjective norm) is related to actual use of innovation. We see thus that workplace innovation has an indirect effect on positive organisational outcome in the form of innovation adoption (Pot et al, 2017; Putnik et al, 2019), and that intention to use innovation, as postulated by the Theory of planned behaviour (Ajzen 1985; 1991; Fishbein & Ajzen 1975) has also been supported in this study.

In comparison with earlier research on innovation adoption under a sample of managers (Putnik et al. 2019), we see a number of similarities and differences. Similarities concern individual characteristic of innovative behaviour, which is related to perception of innovation in both samples as well as perception of innovation (usefulness and ease of use) which is related to actual use of innovation. On a more detailed level concerning relationships, we see that innovative behaviour in the eyes of managers is related to all aspects of perception of innovation while for employees it is related only to result demonstrability. It can be that in the eyes of management more focus lies on individual responsibility concerning perception of innovation, while among employees, it seems to be determined by organisational factors. Implicitly, managers seem to put more responsibility on employees concerning perception of innovation, while employees put more emphasis on management for innovation adoption (via social norm). Another difference is that in the eyes of the managers, actual use of innovation was directly related to organisational aspects, such as autonomy, team voice and employee engagement, while for employees this went via perception of innovation.

Surprisingly, autonomy in work does not play a role in the regression analysis. It appears that structural elements (as defined by autonomy as part of job design), seems to be less relevant than culture related elements (engagement, input in teams, subjective norm) for the implementation of innovations. Another explanation for these findings may be related to the wording of the questions. Namely, employee engagement and subjective norm have been asked directly in relation to innovation, while level of autonomy has been asked in general terms, and not specifically in relation to innovation adoption. It might be that employee engagement and team voice is perceived as in fact having a say in the innovation process.

Based on other literature, we know that investing in autonomy of employees is essential for creating active jobs (De Sitter et al. 1997; Karasek 1979), and also for ensuring that employees themselves come with ideas for new innovations (Hansen, Amundsen, Aasen & Gressgard 2017). While this research showed no significant relationship between autonomy and innovation adoption: perhaps due to the fact autonomy that was measured indirectly related to innovation adoption, or the fact that we did not make a distinction in type of innovation, like organisation driven vs employee driven, more in-depth examination is needed. Such research needs to distil the exact role of autonomy for the process of innovation, rather than for straight forward autonomy in the primary job execution process. In interpreting these findings, it is also important to keep in mind that the employees and managers were not from the same organisation, and that the differences in findings may relate to differences in organisations as such rather than differences in experiences among managers and employees.

Although this research has been based on validated concepts to build a theoretical framework, and while it has used validated questions to answer the research question, an issue remains to what extent we have brought theorising on innovation, and workplace innovation in particular, beyond the state of what we already knew. The findings tell us that elements of workplace innovation have at least an indirect effect on the uptake of innovation. Employee engagement of workers in the innovation process seems highly relevant. While their job autonomy might not be decisive, if management provides clear exemplifying behaviour (subjective norm) and the innovation is experienced as easy to use, their acceptance and lack of resistance could be highly crucial conditions for successful implementation of renewal. This observation could shift our attention to processes in which employees perform, instead of focussing on formal job descriptions (having autonomy in one's work) or the division of labour and power relations designed into the structure of job and organisation (as static facts). Innovation processes are dynamic and, in every stage, (like in innovation stage gate models) the tasks, roles and relations of involved employees may shift.

Because this aligns so well with the general notion that workplace innovation is not a goal in itself, but a means to an end, how this exactly works requires further examination.

Limitations

A first limitation is the cross-sectional design of the study. This cannot provide conclusive evidence of causal and mediating relationships. Although we theoretically and empirically hypothesised our relationships, future research could include longitudinal and field experimental designs to investigate the causal directions in our research model. Alternatively, future surveys among larger response groups would allow a more firmly based generalized innovation adoption construct using exploratory factor analysis (see for example Brooke Dobni 2008). While this does not solve the issue of causality, it does provide more insight. Subsequently, gathering information about innovation adoption at different levels of the organisation (i.e. employees, managers, teams, organisation as a whole) would be helpful to support a richer multi-level perspective on the topic (Anderson, Potočnik, & Zhou 2014). Also, a limitation of the study is that the response rate has been rather low, which may be related to the length of the survey and the fact that participants have been approached only via e-mail. For future research, it would be interesting to explore whether different types of innovation (manager vs employee initiated; product or process centred), have different paths of innovation adoption.

Finally, given the importance of employee engagement, it would be necessary to carry out qualitative research more in depth on this topic, to better understand the mechanisms and processes behind it. Additionally, we are aware of the fact that our study is rather static in time and linear in its design. Time studies and integrating a complexity perspective to provide insights in the interactive and iterative nature of the innovation process would better correspond to the reality of innovation as a process (Garud, Tuertscher & Van de Ven 2013; Van de Ven 2017), but remains a recommendation for future endeavours. Lastly, we would recommend carrying out cost-benefit analyses for carrying out innovation adoption based on workplace innovation principles, based on both subjective as well as objective data to support the analysis. This would give us tangible benefits of workplace innovation in relation to innovation adoption capacity and further evidence of the importance of workplace innovation (Dhondt, Totterdill, Boermans & Ziauberyte-Jakstiene 2017).

Implications for practice

Based on our findings we highlight implications for organisations to implement innovation in their organisation: implications for individual behaviour of employees, organisational aspects, and elements of perception of innovation.

Individual behaviour: This study proves that innovative behaviour helps the innovation adoption process. However, there should be enough psychological safety for employees to feel welcome to bring input to their team and not worry about being ostracised for their ideas. When psychological safety is present, it also ensures that ideas that are brought in, are actually heard and seriously considered (Edmondson 2012; LePine & Van Dyne 2001; Oeij 2018). Furthermore, managers could encourage innovative behaviour of employees by giving them enough room to develop their ideas and in this way make use of their professional knowledge and creativity. Providing employees with challenging work assignments can also be a proven practical way to stimulate innovative behaviour (Preenen, Dorenbosch, Plantinga, & Dhondt 2016).

Organisational aspects: Managers could actively engage their employees in the process of innovation adoption. This means not only giving employees the space and time to share their opinion about the innovation (i.e., team

voice), but also engaging them in the decision-making process concerning innovation itself. However, especially the part of giving the decision-making power to the employees when it comes to innovation can seem threatening to managers. Earlier research defies such viewpoints of unease and threat. We showed in a previous study that logistics organisations that gave this kind of power to their employees (alongside with autonomy and team voice), more than twice as likely have succeeded in innovation implementation (i.e. actual use of innovation), than organisations where employees do not have decision making power concerning innovation and have low autonomy and team voice (Putnik et al., 2019). Linked to this, also open and transparent, two-way communication between the management and employees is of major importance, as it benefits innovation adoption by lowering the resistance to change (Dhondt, Totterdill, Boermans & Žiauberytė-Jakštienė 2017). Engaging employees in challenging tasks (innovation development) and giving them room to give input, leads employees to see the relevance of what is being developed and in turn they are more likely to use it. Employee engagement has proved to be effective in different international and cultural contexts (Oeij, Ziauberyte-Jakstiene, Dhondt, Corral, Totterdill & Preenen 2015) and especially also in SMEs (Oeij, De Vroome, Bolland, Gründemann & Van Teeffelen 2014).

Perception of innovation: To ensure positive perception of innovation, it is important that the employees have a chance to try out the innovation while it is being developed or tested for implementation in the organisation. It is also recommended that they obtain support in this phase from the persons who are (more) familiar with the innovation, in order to perceive benefits of innovation when it comes to ease of use and usefulness and also have a chance to give feedback about it, further improving the innovation (Putnik et al. 2019). Furthermore, it is important that the management communicates how much importance they give to the use of innovation by employees, as the more they attach importance to it and make it known among employees, the more likely the employees are to use innovation.

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