Micro-foundations of innovation

Employee silence, perceived time pressure, flow and innovative work behaviour

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Abstract

Purpose – The purpose of this paper is to extend current discussion on the drivers of innovative work behaviour (IWB) of individuals by connecting theories of flow (personal factor), employee silence (relational) and time pressure (contextual).
Design/methodology/approach – Data have been collected from employees of five companies based in Italy ($n = 608$).
Findings – Silence is negatively related to IWB, whereas flow has the opposite association. Perceived time pressure moderates the relationship between employee silence and IWB. Furthermore, the findings indicate that the highest levels of IWB will take place when the flow level is high, individuals are absorbed in and enjoy their work, and the level of employee silence is low, enabling them to exchange ideas and obtain the necessary support and resources. At the same time, low levels of time pressure provide them with sufficient time for innovative processes to take place, ideas to be shared, and individuals to become engrossed in their innovations.
Research limitations/implications – Cross-sectional single-source data set.
Practical implications – Establishing a work context favourable for stimulating each employee's active contribution towards IWB based on a complex interaction among flow, silence and time pressure.
Originality/value – Building on the theories of flow and the relational model of employee silence and combining their logic, the research not only delves into the two specific paths to IWB but also examines their multiple effects. Furthermore, the authors pin both factors (silence and flow) under the contextual influence of perceived time pressure, investigating how they simultaneously relate to IWB.

Keywords Flow, Innovative work behaviour, Employee silence, Micro-foundations, Perceived time pressure
Paper type Research paper

1. Introduction

Creativity and innovative work behaviour (IWB) have gained the attention of researchers and practitioners for decades. The concept of an IWB originates from individuals' creative behaviour that helps generate, modify, communicate and implement novel ideas. Innovative initiatives tend to rely on individual-level employee characteristics and behaviour at work (Chen and Huang, 2009; Hirst *et al.*, 2009). The interactionist perspective of individual-level creativity and innovation assumes the interplay of contextual and personal factors with IWB to promote or hinder creativity at work (Ford, 1996; Janssen, 2005; Oldham and Cummings, 1996; Woodman *et al.*, 1993). Pushed by sudden and deep changes in their competitive landscapes, organisations are trying to explore how to stimulate individual creativity and IWB in an attempt to remain competitive over time (Hirst *et al.*, 2009; Oldham, 2003). Particularly, there has been a remarkable concentration of social science researchers aiming to find out the determinants that influence employee IWB (Ma Prieto and Pilar Pérez-Santana, 2014; Scott and Bruce, 1994; Woodman *et al.*, 1993).

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Despite these discussions, scholars' understanding of the individual drivers of IWB and their interplay with relational and contextual factors remains limited and a momentous agenda for researchers (Černe *et al.*, 2014; Shalley and Zhou, 2008).

Despite the various personal and contextual factors at work that have been discussed in extant literature (Aleksić *et al.*, 2016; Amabile, 1996; Shalley and Gilson, 2004; Woodman *et al.*, 1993), relatively little attention has been devoted to uncovering the consequences of employee silence (Van Dyne *et al.*, 2003), perceived time pressure (Putrevu and Ratchford, 1997) and flow (Bakker, 2008) on individuals' IWB. This is unfortunate because two sets of theories inform researchers about these factors' salience for creativity and IWB. First, the flow theory (Csikszentmihalyi, 1991, 1997a) describes the psychological state of flow as total absorption and focus; as such, it pins this factor as a crucial predictor of IWB. Second, the relational model of employee silence (Donaghey *et al.*, 2011; Milliken *et al.*, 2003; Van Dyne *et al.*, 2003), based on the social perspective of creativity (Ohly *et al.*, 2010; Perry-Smith and Shalley, 2003), obstructs the sharing of ideas in the idea-generation phase and social support in the implementation phase of IWB.

This research aims to contribute to the current discussion by providing a better understanding of the situational cues or conditions – and their interactive roles– that facilitate individuals' IWB (Hirst *et al.*, 2009; Rothaermel and Hess, 2007; Scott and Bruce, 1994; Taggar, 2002). Building on the theories of flow and the relational model of employee silence and combining their logic, the main research question of this study how two specific paths of flow and silence lead to IWB, and how they interact with one another. Furthermore, we pin both factors (silence and flow) under the contextual influence of perceived time pressure, a typical "problematic" contextual variable in this stream of studies but an ever-present phenomenon in today's dynamic work environment. Thus, a subsidiary research question of our study is how flow, silence and time pressure simultaneously (at different levels of each of these three factors) relate to IWB.

This study's intended main contributions to the IWB literature are threefold. The first one is to disentangle the two distinct paths linked to IWB; one promotive and the other preventive, in order to add flow as a positive and employee silence as a negative contingency for stimulating employees' IWB. The second intended contribution relates to the moderating role exerted by perceived time pressure, a variable that in itself has no clear direct effect on individuals' IWB, yet accentuates (or exacerbates) the impacts of other variables. The third contribution that this study attempts to make is related to combining the theories of employee silence and flow into a model that explains the interaction (multiple effects) among contextual (time pressure), relational (employee silence) and personal (flow) factors. Such an approach complements the interactionist perspective on creativity and IWB (Woodman *et al.*, 1993) by expanding the nomological net of the antecedents of IWB and bringing together ideas from previously unrelated theories that supplement one another on their relational and personal aspects.

This paper continues as follows. Section 2 provides the theoretical background to our research hypotheses. Section 3 details the methodology and the research setting. Section 4 presents the results, which are then discussed in depth in Section 5. Section 6 concludes the paper by highlighting further research opportunities and identifying our study's limitations.

2. Theoretical background and hypothesis development

Starting from the earliest studies on innovation by Schumpeter (1912/1934, 1942), increasing evidence has corroborated the view that innovation represents a driving force of a firm's performance. Thus, over time, a lot of effort has been spent in trying to understand what drives and supports firms in becoming more innovative, mostly at the organisational level initially (Eisenhardt and Martin, 2000; King *et al.*, 2001; Rothaermel and Hess, 2007; Stalk *et al.*, 1992).

More recently, an emerging stream of literature has increased its focus on individuals, their characteristics, beliefs and behaviours (Grigoriou and Rothaermel, 2014) as primary drivers of firms' performance levels. Such drivers are also known as "micro-foundations"; despite being micro, the main assumption is their relevant impact on a firm's innovation results (Grigoriou and Rothaermel, 2014). In general terms, this theme is gaining ground in the strategic and organisational literature (Eisenhardt *et al.*, 2010; Felin and Foss, 2005; Greve, 2013; Grigoriou and Rothaermel, 2014) and is attracting increasing academic interest (Barney and Felin, 2013; Felin *et al.*, 2015; Foss, 2010; Foss and Lindenberg, 2013). The main purpose of such studies is to identify whether and how individual-level factors or interactions among individuals influence the collective level of an organisation's performance (Felin *et al.*, 2015; Ployhart and Hale, 2014).

2.1 Employee silence

Researchers are paying increasing attention to the phenomenon of employee silence (Brinsfield, 2009) to understand whether and how this behaviour affects firms' performance levels. It is well established that within organisations, the circulation of knowledge and information nurtures innovation. Thus, whereas knowledge sharing is beneficial to the innovating firm, knowledge hiding brings opposite outcomes. However, sometimes people do not hide information and knowledge on purpose or cause intentional damage to the organisation they work for. They simply avoid communicating ideas, information, concerns, questions, comments and opinions that they have in mind for different reasons (Morrison, 2014; Morrison and Milliken, 2000; Pinder and Harlos, 2001). This is the space where employee silence originates.

Employee silence represents the individual alter ego of "organisational silence", a construct normally applied at a firm level (Bowen and Blackmon, 2003; Morrison and Milliken, 2000) to portray the phenomenon of employees withholding information (Morrison and Milliken, 2000). The need for a fine-grained investigation of the phenomenon relies on the fact that sometimes an individual's behaviour is partially or totally misaligned with a group's behaviour/functions and even with the organisation to which he or she belongs (Donaghey *et al.*, 2011; Tangirala and Ramanujam, 2008; Van Dyne *et al.*, 2003).

There can be several reasons why employees decide not to speak, ranging from a simple lack of knowledge (Morrison, 2014) to fear, anxiety and work-related burdens (Van Dyne *et al.*, 2003). According to Detert *et al.* (2010), employees are more reluctant to speak when they believe that the information could be perceived as threatening or negative by the recipient. Additional reasons include past experiences of injustice (Lu and Xie, 2013) and the fear that knowledge sharing will make fellow workers more competitive (Perry-Smith, 2006). In general terms, employees could decide to remain silent due to simple acquiescence, for defensive reasons or sometimes for prosocial reasons, such as when they think that they have nothing relevant to contribute to a debate or that adding something could provoke others (Pinder and Harlos, 2001; Van Dyne *et al.*, 2003).

While firms could benefit from a better understanding of the causes that force their employees to remain silent, there is little doubt that managers are more troubled by the immediate consequences of such behaviour (Bogosian, 2012). Withholding one's expression of opinions may cause harm to managers or organisations (He *et al.*, 2017). Indeed, employee silence is associated with various individual dysfunctional behaviours and negative organisational outcomes (Brinsfield, 2013), including decrease in innovation potential (Argyris and Schön, 1978), reduction in job satisfaction (Morrison and Milliken, 2000; Vakola and Bouradas, 2005) and increase in stress and depression at the workplace (Cortina and Magley, 2003). The negative outcomes of silence have also been analysed in relation to some emblematic and dramatic organisational failures, for instance, the Columbia space shuttle disaster in 2003 (Bies, 2009) and Enron's bankruptcy that followed the infamous scandal in 2001 (Milliken *et al.*, 2003).

Based on Perlow and Repenning (2009) qualitative research, they conclude that employee silence could result in psychological changes in individuals. For instance, it may give rise to feelings of humiliation, anger and bitterness that can harm each interaction within an organisation and ultimately diminish creativity and productivity. In sum, scholars have long speculated about the negative effects of silence within organisations. As for innovation-related purposes, both creativity and innovation rely on the sharing of information and prior relevant knowledge (Amabile, 1983). Therefore, withholding relevant information may restrict employees from collecting details about existing situations that would have yielded better solutions (Reiter-Palmon and Illies, 2004). According to Edmondson (2003), if employees do not share new ideas, opinions, thoughts and concerns, this may impede their innovation capability. Employee silence may have significant creativity-damaging effects in an organisation, and further empirical testing has been urgently called for in this regard (Morrison, 2014). Černe *et al.* (2014) study shows that the lack of knowledge-sharing behaviour inhibits holders' own creativity, as well as that of co-workers. Hence, there is an intense need for managers and organisations to investigate how to alleviate the effects of this attitude. Based on the cited literature, we hypothesise on the relationship between employee silence and IWB as follows:

H1. Employee silence is negatively related to IWB.

2.2 Flow at work

The individual and organisational job-related antecedents of work motivation have long been the focus of attention of organisational psychologists (Hackman and Oldham, 1980). In 2000, Martin Seligman and Mihaly Csikszentmihalyi initiated the positive psychology movement with the intention of studying creative and constructive aspects of human behaviour at both individual and social levels (Delle Fave *et al.*, 2011). The core component of positive psychology is the optimal experience or "flow" (Fullagar and Kelloway, 2009). Initially proposed by Csikszentmihalyi (1975, 1991), flow is defined as the state of being involved in a task with total concentration and commitment that nothing else seems to matter (Bakker, 2008; Csikszentmihalyi and Csikszentmihalyi, 1988; Fullagar and Kelloway, 2009). In other words, flow is the state of mind in which employees enjoy doing their work with motivation despite the time, energy and efforts they devote to it (Bakker, 2008; Csikszentmihalyi and Csikszentmihalyi, 1988; Salanova *et al.*, 2006). Flow also refers to a situation of focussed attention, optimal level of performance and utmost utilisation of skills, or it is more generally described as the meeting point of attention, motivation and a situation that may result in better productivity of employees (Csikszentmihalyi, 1991).

The widely accepted elucidation of flow comprises three core elements, including absorption, work enjoyment and intrinsic work motivation (Bakker, 2008). Absorption is defined as the psychological condition in which employees are totally engrossed in their work that they forget everything else around them and even do not care about the time spent on the job (Csikszentmihalyi, 1991). Work enjoyment refers to the state of pleasure and the positive evaluation of the work life (Bakker, 2005, 2008; Csikszentmihalyi, 1997b). The happiness felt in the work performance is the result of a positive cognitive and effective appreciation for the flow (Diener, 2000). Intrinsic motivation pertains to the driving force to perform work-related activities to obtain innate satisfaction and enjoyment (Bakker, 2008). Previous research provides evidence that the above-mentioned three dimensions of flow are positively related (Bakker, 2005; Mäkikangas *et al.*, 2010), validated in empirical studies (Geyser *et al.*, 2015) and identified as better fitted to measure flow at work (Demerouti *et al.*, 2012).

The flow experience reveals significant outcomes in work domains (Csikszentmihalyi and LeFevre, 1989) and creativity processes (Csikszentmihalyi, 1996). Plenty of studies indicate that the state of flow likely develops when an individual has perceived clear goals

(Fullagar and Kelloway, 2009; Salanova *et al.*, 2006). The clear understanding of required outcomes develops an inner motivation and a sense of pleasure to complete the task with concentration (Csikszentmihalyi, 1997b). The work enjoyment experience fosters positive performance outcomes (Aleksić *et al.*, 2016; Mathwick and Rigdon, 2004), such as enhanced self-esteem (Wells, 1988), positive emotions (Eisenberger *et al.*, 2005), a high level of satisfaction (Ceja and Navarro, 2011), creativity (Larson, 1988) and so on. Flow shows a correlation with the constructs of positive work behaviour and employee well-being (Mäkikangas *et al.*, 2010). There are proofs that individuals who are motivated by flow report more positive work experiences than those who are demotivated by apathy (Csikszentmihalyi and LeFevre, 1989). Positive organisational behaviour demonstrates positive abilities of employees (Cameron, 2003), leading to optimum work performance in the form of enhanced job performance, creativity and innovation (Zubair and Kamal, 2015; Engeser and Baumann, 2016).

Flow exhibits a psychological instrument that may help in recognising the contextual factors linked to creativity in work domains (Amabile, 1996). An aspect of flow, work enjoyment is an essential predictor of creativity but lacks evidence of how it facilitates creative processes in work settings (Aleksić *et al.*, 2016). The research evidence proves that flow is a significant predictor of improved performance, but the relationship between flow and innovative behaviour has not been directly tested in previous studies (Zubair and Kamal, 2015). A rigorous empirical study to understand the direct relationship of personal and psychological aspects (flow–absorption, work enjoyment and intrinsic motivation) with IWB would address the literature gap and could help cultivate creativity in organisations. From such premises, we formulate the following hypothesis, as follows:

H2. Flow is positively related to IWB.

2.3 Perceived time pressure and its interaction with individual and relational factors influencing IWB

Time pressure is defined as the level of stress perceived by individuals due to time constraints (typically deadlines) while handling their daily work-related tasks (Kelly and Karau, 1999; Pepinsky *et al.*, 1960). Prior research has revealed that the effects of time pressure on employees' performance can vary considerably (Amabile *et al.*, 2002). Kelly and Karau (1999) claim that individuals and groups work more efficiently under time pressure. Working under a time limit impels employees to prioritise their activities (Ellis, 2006). Using the activation theory as their theoretical framework, Ohly *et al.* (2006) demonstrate that a moderate level of time pressure excites an optimal level at the activation stage that facilitates creative idea generation and implementation.

However, efficiency can be achieved at the expense of effectiveness and creativity, due to the time limit for processing information and ideas (Amabile *et al.*, 2002). According to Breen's (2004) study, employees can be productive under time constraints only if they are able to concentrate on the problem at hand. Particularly, people report being more creative under time pressure although a comprehensive a posterior evaluation indicates that it is only partially true and that in the proximity of an important deadline (just before and some days after), the levels of creativity tend to decrease significantly (Breen, 2004).

Further research demonstrates that time pressure at both low and high levels could diminish creativity; however, the intermediate level of time pressure raises creativity in an inverted U-shaped curvilinear relationship (Baer and Oldham, 2006; Ohly *et al.*, 2006). Other studies conclude that time pressure may have destructive effects on the level of creativity at work (Amabile, 1996; Hennessey and Amabile, 2010). Widmer *et al.* (2012) indicate that time pressure hinders work-related outcomes. Creativity requires time to process information and to engage in creative cognitive behaviour (Amabile, 1983); time pressure restricts this

process and stifles creative results (Hsu and Fan, 2010). The evidence from the existing literature shows that time pressure may have a positive, negative or no effect on creativity, depending on boundary conditions (Aleksić *et al.*, 2017).

In this study, we follow this balanced position and argue that the effects of time pressure on the level of IWB can be both positive and negative. In other words, we do not expect time pressure to have a specific effect on creativity or individual innovation that is valid under every circumstance. On the contrary, we claim that time pressure will amplify (or diminish) the effects of other variables on IWB.

First, we focus on the interaction between time pressure and employee silence. Again, it has been reported that time constraints extinguish employees' motivations (Beck and Schmidt, 2013), lead to reduced (and insufficient) amounts of information processing (Ben Zur and Breznitz, 1981), force employees to rely on existing methods and parameters, which could prove to be the non-optimal ones (Amabile *et al.*, 2002) and decrease interpersonal relationships (Driskell *et al.*, 1999; Perlow, 1999), with eventual consequences of reduced productivity, creativity and IWB (Amabile *et al.*, 2002).

Further evidence shows that under time pressure, employees could be less likely to engage in communication with co-workers, potentially generating a lack of information-sharing behaviour or hiding information, manifesting in employee silence (Connelly *et al.*, 2014). Connelly *et al.*'s (2014) study further emphasises that time pressure can influence knowledge sharing at the information-filtering and decision-making phase, and can even stimulate deliberate and intentional knowledge hiding (Škerlavaj *et al.*, 2018). Based on the relational model of employee silence, time and resources are of critical value for employees to express their voices and refrain from hiding their information (Donaghey *et al.*, 2011; Milliken *et al.*, 2003; Van Dyne *et al.*, 2003), which are needed for combining ideas, selecting the best ones and implementing them in innovations. Indeed, time pressure can either trigger or hamper the IWB of individuals in certain contextual aspects. To obtain an accurate picture of the factors influencing IWB, it is recommended that the investigation be expanded beyond the direct effects of time pressure. Employee silence posits a negative relationship with IWB as proposed above, but this association may be shaped by the context of time pressure.

Complementing Connelly *et al.*'s (2014) study that has shown the negative consequences of time pressure on knowledge exchange, we claim that time pressure will moderate the negative effect of employee silence on the level of IWB. Particularly, a high level of perceived time pressure will contribute to breaking barriers and forcing individuals to increase their level of communication. Time pressure will, thus, force people to exchange more information with co-workers and do so more quickly to find original solutions that may lead to creative idea generation or implementation. Based on this perspective, we propose the following hypothesis:

H3a. Perceived time pressure at work moderates the relationship between employee silence and IWB. When perceived time pressure is high, the relationship between employee silence and IWB is less negative than when perceived time pressure is low.

This paper revolves around the argument that perceived time pressure will exert different and opposite indirect effects on employees who are characterised by a high level of silence or by a high level of flow. Thus, contrary to the proposed relationship between silence and IWB, we assume a positive relationship between work-related flow and IWB, as well as expect that an increase in perceived time pressure will have deleterious effects on this relationship. As discussed by Kelly and Karau (1999), employees under time pressure may be more productive but less creative. Thus, we claim that in a situation characterised by high engagement and commitment (flow), where individuals already find joy and meaning in doing their jobs (Bakker, 2005, 2008), time pressure (imposing severe deadlines) will likely have the opposite outcome and decrease their intrinsic motivations (Chang and Chen, 2013). This will contribute to worsening the climate beneficial for IWB, thus reducing individuals'

spontaneous contributions to innovation. Based on this perspective, we propose that although the flow at work significantly enhances creativity, time pressure will relate to it negatively. The research hypothesis follows:

H3b. Perceived time pressure at work moderates the relationship between flow and IWB. When perceived time pressure is high, the relationship between flow and IWB is less positive than when perceived time pressure is low.

Figure 1 demonstrates the theoretical framework comprising the hypotheses of this study. The final contribution that this study attempts to offer is a three-way interaction. The endeavour leads to incorporating the personal (flow) and relational (employee silence) theories and the ever-present contextual (time pressure) factor in a model for predicting IWB. As already discussed, work-related flow strengthens IWB, employee silence posits a negative relationship and time pressure exhibits mixed effects. This means a situation in which employees are fully motivated, enjoy their work (high level of flow) and communicate with one another (low level of employee silence) for solutions to a problem, which will be completed in sufficient time (perceived low time pressure). The highest levels of IWB will, thus, take place when flow is high and individuals are absorbed in and enjoy their work, making this an optimal experience (Csikszentmihalyi, 1991), and when employee silence is minimal so that according to the relational model of silence (Donaghey *et al.*, 2011; Milliken *et al.*, 2003; Van Dyne *et al.*, 2003), employees are able to exchange ideas and obtain the needed support and resources. At the same time, low levels of perceived time pressure should provide them with the sufficient time needed to engage in innovative processes (Baer and Oldham, 2006; Roskes *et al.*, 2013), obtain the support required for implementation (Škerlavaj *et al.*, 2014), exchange ideas (Paulus and Yang, 2000) and become engrossed in their innovations. Based on this theorem, we assume that the three-way interaction among a high level of flow, a low level of employee silence and a low level of time pressure would yield the highest level of IWB. The research hypothesis follows:

H4. A three-way interaction exists among perceived time pressure, flow and employee silence in predicting IWB. The highest level of IWB is a result of a high level of flow, a low level of time pressure and a low level of employee silence.

3. Methodology

3.1 Research setting, participants and procedures

Empirical data were collected from 719 employees in five Italian medium-to-large organisations from September 2014 to April 2015. We used a convenience non-probability

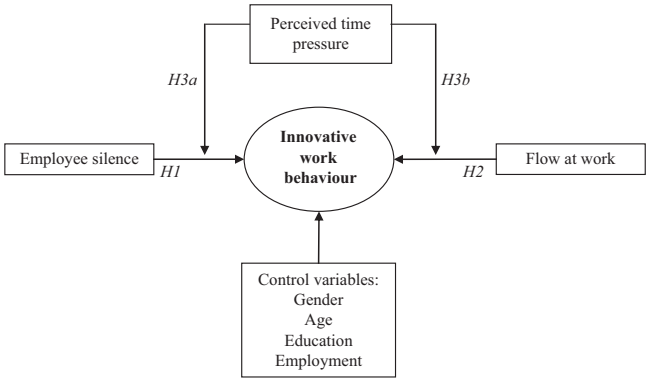

Figure 1.
Theoretical framework demonstrating all hypotheses

sampling approach to approach these organisations, and then targeted the whole population of the employees within these firms. After excluding questionnaires with missing values, 608 were left as valid responses. To reach our target respondents, we included only the white-collar workers, as they are most likely to be involved in the innovation process and get involved in the decision making about innovation implementation in these firms. We collected data through a web-based questionnaire. The items used in this study were part of a large-scale questionnaire so that the respondents would more likely be unable to assume the study's objective and then manipulate their answers. Each questionnaire had been assigned a unique numeric code to keep the respondents anonymous within the contributing organisations. Initially, the questionnaire was developed in English, followed by a back-to-back (Brislin, 1980) translation to present it in the Italian language.

Firm A is a metal tool (e.g. cutterheads, circular sawblades) manufacturing company with four production facilities, over 1,000 employees and more than 36,000 products. A total of 94 employees from this firm answered the questionnaire. Firm B is a large Italian coffee maker and coffee machine producer with 1,080 employees worldwide. Out of the 200 employees in its headquarters, 25 responded to our questionnaire. Firm C is a manufacturer of outdoor climate control equipment (with the objective to maintain the "made-in-Italy" standard), with 140 employees and a production facility for various products (e.g. arm awnings, bioclimatic pergolas). This firm's workers claim to be the best in creativity, professionalism and design. From this organisation, 43 employees responded to the questionnaire. Firm D is a gas, energy, water and waste management company with more than 8,000 employees all over Italy. It is extensively involved in innovation and improvement in terms of technology, management and processes for environmental sustainability. An estimated 455 employees responded to our questionnaire. Lastly, Firm E offers oil, gas and power management solutions for global marine industry and largest producer of marine engines in Europe. This firm currently comprise around 1,300 employees and 102 answered to the questionnaire.

The descriptive statistics showed that on average, 72.6 per cent of the participants were male (SD = 0.446); about 32.2 per cent belonged to the 36–45 age group, and 38.9 per cent belonged to the 46–55 age group (SD = 0.921). On average, 50.4 per cent had a bachelor's-level education, followed by 33.3 per cent with a higher secondary school diploma (SD = 0.732). An estimated 94.4 per cent were full-time employees (SD = 0.324).

3.2 Measures

All items were assessed on a seven-point scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). As previously stated, all items used in this study were measured as part of a questionnaire that included plenty of items to address. Therefore, it was hardly possible for the respondents to assume the specific purpose of the study, allowing us to obtain reliable answers. Further details are presented below.

Employee silence was measured with four items adapted from Van Dyne *et al.* (2003) study ($\alpha = 0.847$). One of the items was "I do not speak up and suggest ideas for change, out of fear".

Flow was measured with nine items based on absorption, work enjoyment and intrinsic work motivation, as illustrated by Bakker (2008) ($\alpha = 0.801$). One of the items was "I get carried away by my work; I work because I enjoy it".

Perceived time pressure was measured with four items adopted from Putrevu and Ratchford (1997) study ($\alpha = 0.878$). For example, "I find myself pressed for time when I solve problems".

IWB was observed with 13 items, taken from the works of De Jong and Den Hartog (2010) and Zhou and George (2003) ($\alpha = 0.92$).

To find out potential associations of demographic variables with IWB, we controlled for age, gender, employee education and employment type (full-time/part-time). Creativity literature has demonstrated the diverse effects of age across different domains (Jones and Weinberg, 2011). Similarly, gender differences in creativity, work engagement and working under time pressure reveal varied effects across job types (Baer and Kaufman, 2008; Stoltzfus *et al.*, 2011). Other studies also provide evidence that the level of education fosters employees' intellectual and creative abilities (Fasko, 2001; Shin and Zhou, 2007). Furthermore, employment type (full-time vs part-time) influences the creativity of employees due to differences in compensations, benefits and obligations towards their organisation (Kim *et al.*, 2009).

4. Results

4.1 Descriptive statistics, validity and reliability

We performed confirmatory factor analysis (CFA) to determine construct validity (Koufteros, 1999). The independent variables involved in the measurement model – employee silence, flow and perceived time pressure – consisted of multiple items, with each set considered as one construct. The CFA results demonstrate that these items, respectively, load significantly on their intended constructs ($p < 0.05$), and that the data fit very well with the proposed three-factor model ($\chi^2 = 51.213$, $\chi^2/\text{df} = 39$, goodness-of-fit index (GFI) = 0.987, adjusted goodness-of-fit index (AGFI) = 0.973, comparative fit index (CFI) = 0.966, root mean square residual (RMSR) = 0.024, root mean square error of approximation (RMSEA) = 0.023 and normed fit index (NFI) = 0.880). Previous research indicates a close fit between the model and the data if the RMSEA value is less than 0.05 (Browne *et al.*, 1993). The CFI value extracted from baseline comparisons of the hypothesised model with the independence model demonstrates a good fit of the model in case the value is close to 0.95 (Hu and Bentler, 1999). The GFI value (≥0.90) also represents a good fit of the model (Medsker *et al.*, 1994).

For measurement reliability, we performed discriminate validity analysis (Fornell and Larcker, 1981) to contrast the average variance extracted (AVE) for each construct with the shared variance between the constructs and all other constructs. Table I presents composite reliability (CR), AVE, Cronbach's α values and the comparative correlation matrix of each construct with square-rooted AVE on the diagonal. Table I shows that the AVE of every construct is greater than the shared variance with other constructs. Prior literature (Hair *et al.*, 2010) shows that results exhibit adequate reliability if the CR value is above 0.70 (Bagozzi and Yi, 1988), the AVE is greater than 0.50 (Fornell and Larcker, 1981), and Cronbach's α value is greater than 0.70 (Nunnally and Bernstein, 1994). The CR and Cronbach's α values listed in Table I are greater than 0.70, demonstrating adequate reliability.

4.2 Results of regression analysis

Table II displays the descriptive statistics for all the variables used in the study. Employee silence is negatively correlated with IWB ($r = -0.312$, $p < 0.01$); perceived time pressure is also negatively correlated ($r = -0.056$, $p < 0.10$). On the other hand, flow is positively

	CR	AVE	α	1	2	3	4
1. Innovative work behaviour	0.922	0.543	0.92	0.737			
2. Perceived time pressure	0.871	0.577	0.878	−0.039	0.760		
3. Employee silence	0.851	0.588	0.847	−0.305	0.123	0.767	
4. Flow at work	0.787	0.553	0.801	0.192	0.446	−0.024	0.744

Notes: $n = 608$. CR, Composite reliability; AVE, average variance extracted; α, Cronbach's

Table I. Descriptive statistics

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. Age	3.50	0.92	–							
2. Gender	1.73	0.45	0.098*	–						
3. Education	2.70	0.73	−0.275**	−0.054	–					
4. Employment	1.07	0.32	−0.068	−0.191**	0.010	–				
5. Employee silence	1.87	0.89	−0.022	−0.005	0.000	0.030	(0.85)			
6. Flow	4.57	0.80	0.077	−0.127**	0.000	0.039	−0.148**	(0.80)		
7. Perceived time pressure	4.31	1.28	−0.100*	0.039	−0.005	0.024	0.102*	0.028	(0.88)	
8. Innovative work behaviour	5.39	0.81	0.102*	0.111**	0.065	−0.107**	−0.312**	0.332**	−0.056	(0.92)

Notes: $n = 608$. Coefficient αs are on the diagonal in parentheses. Age is measured on a scale comprising 1 = "16–25", 2 = "26–35", 3 = 36–45", 4 = "46–55", 5 = "56–65" and 6 = " > 65". For gender, 1 = "female" and 2 = "male". For education, 1 = "middle school", 2 = "high school", 3 = "associate degree" and 4 = "Master's/PhD degree". For employment, 1 = "full-time", 2 = "temporary" and 3 = "part-time". *$p < 0.05$; **$p < 0.01$

Table II.
Means, standard deviations and correlations

correlated with IWB ($r = 0.332$, $p < 0.01$). To test our hypotheses, we performed a series of regression analysis; Table III presents the step-by-step results.

All four control variables were entered in Step 1 (Model 1: $F(4, 603) = 5.834$, $p < 0.000$, $R^2 = 0.037$). All three independent variables (employee silence, perceived time pressure and flow) were entered in Step 2 (Model 2: $F(7, 600) = 24.451$, $p < 0.000$, $R^2 = 0.222$). Employee silence is negatively related to IWB ($\beta = -0.258$, $p < 0.000$), supporting *H1*. The results for employee silence ($b = -0.234$, $t(600) = -7.035$, $p < 0.000$) demonstrate that every unit increase in employee silence decreases 0.234 unit of IWB. Flow is positively related to IWB ($\beta = 0.309$, $p < 0.000$), supporting *H2*. The flow data ($b = 0.315$, $t(600) = 8.354$, $p < 0.000$) show that every unit increase in flow fosters 0.315 unit of IWB. This indicates that flow

	Model 1			Model 2			Model 3			Model 4		
	B	SE	*β*	*B*	SE	*β*	*B*	SE	*β*	*B*	SE	*β*
(Constant)	4.670	0.276		3.770	0.326		3.745	0.326		3.804	0.324	
Gender	0.163	0.074	0.090*	0.241	0.068	0.133**	0.243	0.068	0.133**	0.234	0.067	0.129**
Age	0.102	0.037	0.115**	0.067	0.034	0.076*	0.069	0.033	0.079*	0.069	0.033	0.078*
Education	0.113	0.046	0.102**	0.103	0.042	0.093**	0.104	0.041	0.094**	0.103	0.041	0.093*
Employment	−0.209	0.102	−0.083*	−0.204	0.092	−0.081*	−0.223	0.092	−0.089**	−0.238	0.092	−0.095**
Employee silence (ES)				−0.234	0.033	−0.258**	−0.232	0.033	−0.255**	−0.234	0.033	−0.258**
Perceived time pressure (PTP)				−0.021	0.023	−0.034	−0.019	0.023	−0.030	−0.016	0.023	−0.026
Flow (FL)				0.315	0.038	0.309**	0.317	0.038	0.311**	0.313	0.038	0.307**
Interaction 1 (ES × PTP)							0.054	0.024	0.083*	0.047	0.024	0.072*
Interaction 2 (FL × PTP)							0.009	0.026	0.013	−0.001	0.026	−0.001
Interaction 3 (FL × ES)										0.079	0.041	0.074*
Interaction 4 (ES × FL × PTP)										0.069	0.022	0.122**
R		0.193			0.471			0.478			0.492	
R^2		0.037			0.222			0.229			0.243	
ΔR^2		0.037			0.185			0.007			0.014	
F		5.834			24.451			19.715			17.350	
P		0.000			0.000			0.070			0.005	

Notes: $n = 608$. Dependent variable: innovative work behaviour. *$p < 0.05$; **$p < 0.01$

Table III.
Stepwise regression analysis

facilitates employees' IWB in a positive way. Perceived time pressure at this stage is found to be unrelated to IWB ($\beta = -0.034$, $p > 0.10$). The data show that time pressure ($b = -0.021$, $t(600) = -0.920$, $p = 0.358$) does not directly affect IWB.

At Step 3 (Model 3: $F(9, 598) = 19.715$, $p < 0.000$, $R^2 = 0.229$), we entered the first interaction between employee silence and perceived time pressure (ES × PTP), as well as the second interaction between flow and perceived time pressure (FL × PTP). The first interaction term of employee silence and perceived time pressure (ES × PTP, $\beta = 0.083$, $p < 0.05$) is found to be significant ($b = 0.054$, $t(598) = 2.290$, $p = 0.022$), supporting *H3a*. This shows that perceived time pressure at work moderates the relationship between employee silence and IWB. The interaction was plotted in a combination of highs and lows of the interaction variables in predicting IWB. Figure 2 shows that employee silence negatively affects IWB, but when there is a high level of perceived time pressure at work, the relationship between employee silence and IWB is less negative than when perceived time pressure is low. It can be claimed that perceived time pressure contributes to reducing the negative effects of employee silence. However, it cannot eradicate the problem. Thus, additional managerial and organisational actions are required, at least in the medium to long term.

The second interaction term of flow and perceived time pressure (FL × PTP, $\beta = 0.013$, $p > 0.10$) is found to be insignificant ($b = 0.009$, $t(598) = 0.366$, $p = 0.715$), rejecting *H3b*. This suggests that perceived time pressure at work does not moderate the relationship between flow and IWB. The results demonstrate that a high level of flow generates a high level of IWB, and time pressure does not have any influence on this relationship.

At Step 4 (Model 4: $F(11, 596) = 17.350$, $p < 0.005$, $R^2 = 0.243$), we tested the three-way interaction among employee silence, flow and perceived time pressure (ES × FL × PTP, $\beta = 0.122$, $p < 0.01$), which was found to be significant ($b = 0.069$, $t(596) = 3.168$, $p = 0.002$). The results support the *H4* that personal (flow), relational (employee silence) and contextual factors (time pressure) significantly interact in predicting IWB. Figure 3 presents this three-way interaction, showing that a low level of employee silence, a low level of time pressure and a higher level of flow produce the highest level of IWB.

5. Discussion

This study was designed to examine the relationship between an inhibiting relational (employee silence) factor and a facilitating personal (flow) factor of IWB in an ever-present and challenging contextual factor (time pressure) at work. Based on the conceptual grounds

Figure 2.
Plot of interaction between employee silence and perceived time pressure in predicting innovative work behaviour

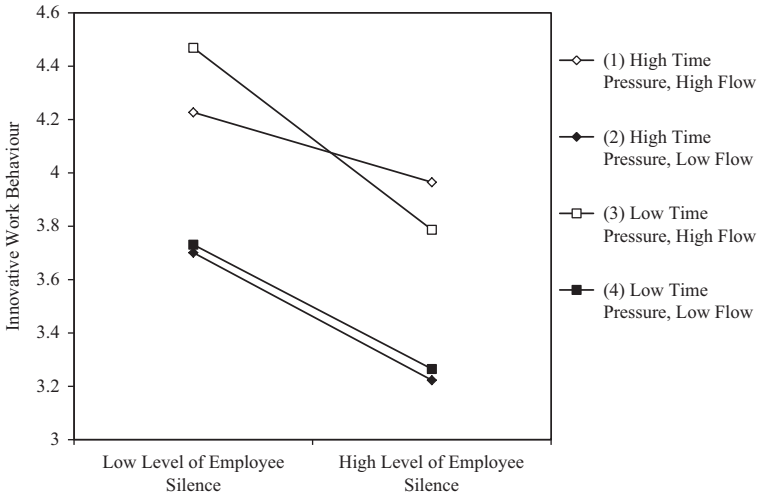

Figure 3.
Plot of three-way interaction among employee silence, flow and perceived time pressure in predicting innovative work behaviour

and empirical research, we presented findings that support employees' IWB. The results indicated that flow positively contributes to employees' IWB, whereas employee silence stifles it. The interaction effects show not only that time pressure moderates the relationship between employee silence and IWB, making it less negative, but also that the highest levels of IWB are attained when both employee silence and time pressure levels are low. No such interaction is found for the multiple effect of flow and time pressure. However, a three-way interaction exists among flow, employee silence and time pressure in predicting IWB, such that the highest levels of this desirable behaviour are established when the flow level is high, and both employee silence and time pressure levels are low. These results provided support for four out of five proposed hypotheses. We present an overview of the status of all hypotheses tested in this study in Table IV.

The findings, albeit not surprising, complement those of extant literature. Existing research on employee silence has examined voice, that is, speaking up about (potentially creative) ideas (Van Dyne *et al.*, 2003), job satisfaction, well-being and turnover intentions (Knoll and van Dick, 2013) and organisational commitment (Vakola and Bouradas, 2005) as outcomes of silence. Similarly, flow has mostly been examined as a predictor of creativity, without accounting for the extension into idea implementation and other stages of IWB (De Jong and Den Hartog, 2010). Following recent developments in the literature on the micro-foundations of innovation (Baer, 2012; Škerlavaj *et al.*, 2014), we focus on the construct of IWB as our dependent variable, thereby presenting a more comprehensive account of this important phenomenon at work.

Table IV.
Overview of the status of hypotheses according to our empirical study

	Hypothesis	Status
H1.	Employee silence is negatively related to IWB	Supported
H2.	Flow is positively related to IWB	Supported
H3a.	Perceived time pressure at work moderates the relationship between employee silence and IWB	Supported
H3b.	Perceived time pressure at work moderates the relationship between flow and IWB	Unsupported
H4.	A three-way interaction exists among perceived time pressure, flow and employee silence in predicting IWB	Supported

Our study supports the stream of literature that posits time pressure as a negative contingency of IWB (Baer and Oldham, 2006) although in our case, this is only true in its contextual nature (i.e. in an interaction with employee silence), not in terms of its direct relationship with IWB. Regarding the interaction of time pressure with flow, no significant moderation could be claimed, meaning that additional potential boundary conditions could be at play and that research would benefit by accounting for complex three-way interactions, which was what we did in the next step.

Indeed, our findings support the hypothesis that the highest levels of IWB will take place when the flow level is high, individuals are absorbed in and enjoy their work and employee silence is minimal, enabling them to exchange ideas and to obtain the necessary support and resources. At the same time, low levels of time pressure provide employees with the sufficient time needed for innovative processes to take place (Baer and Oldham, 2006; Roskes *et al.*, 2013), ideas to be exchanged and individuals to become engrossed in their innovations. These results further confirm the view that for ideas to be generated, selected, promoted and implemented, time pressure acts as a negative contextual contingency.

6. Conclusions, contributions and implications

6.1 Theoretical contributions

This study makes three distinct contributions to the IWB literature. First, we conceptualise two distinct paths, one promotive (stimulating) and the other preventive (inhibiting), towards IWB by focussing on the direct predictors of a personal (flow) and a relational (employee silence) nature. While our results on the roles of flow (positive) and employee silence (negative) are generally in line with those of existing studies on the promotive vs inhibitive effects, respectively, of the two factors, they extend the nomological net of both flow and silence to include IWB as its outcome.

The second contribution of this study extends research on the contextual factors of IWB and is related to the moderating role played by perceived time pressure. The study fits into the extant literature that has previously presented mixed findings of this contingency – both positively (i.e. Schmitt *et al.*, 2015) and negatively (i.e. Baer and Oldham, 2006) – related to the realisation of innovative outcomes. Our findings show that when perceived time pressure is high, the relationship between employee silence and IWB is in fact less negative. However, the highest levels of IWB in our sample are discovered at low levels of perceived time pressure and employee silence. This speaks about the need for time and resources for the relational model of silence to be realised and for ideas to be expressed, exchanged and combined in order for employees to capitalise on them and innovate. This finding has the potential to inform the stream of literature on the relational model of silence that has, thus, far not focussed on these required resources yet (Donaghey *et al.*, 2011; Milliken *et al.*, 2003; Van Dyne *et al.*, 2003).

Accordingly, the third theoretical contribution of this study, and perhaps the most important one, is related to connecting the theories of flow and the relational model of silence with the social perspective of IWB. We did so to conceptualise and to test a three-way multiple-effect interaction among contextual (time pressure), relational (employee silence) and personal (flow) factors of IWB.

6.2 Managerial implications

In an increasing dynamic and competitive environment, organisations struggle to become more innovative to differentiate themselves from competitors. Each employee's active contribution becomes critical to reach this goal (George, 2007). Our study indicates that work-related flow stimulates the creative behaviour of employees. However, managers should be aware that specific internal conditions are needed to increase the probability of developing flow. Particularly, previous literature has already associated with high levels of flow with the clarity of the goals to be achieved (Fullagar and Kelloway, 2009;

Salanova *et al.*, 2006), positive feelings in the work environment (Eisenberger *et al.*, 2005) and a high level of job satisfaction (Ceja and Navarro, 2011). Thus, managers need to design job descriptions in a manner that fosters the intrinsic motivations of employees.

Managers should also gain a better understanding of the causes that force their employees to remain silent since silence diminishes the staff's innovative contributions. As already discussed, there can be several reasons why employees decide not to speak, including fear, anxiety, work-related burdens, the lack of constructive feedback within the organisation and others. Next, managers need to establish a non-instrumental, caring, independent and ethical organisational climate and should not expect similar outcomes according to the rules and procedures. Firms can also overcome employee silence by counteracting an unfavourable reward system, role stress and job insecurity.

Lastly, managers should be aware of the double-edge effect generated by time pressure. Specifically, putting too much pressure on employees can decrease the overall creative returns of individuals and teams if these are immersed in a positive flow.

6.3 Limitations and suggestions for future research

This study's findings should be interpreted with its limitations in mind. The primary drawback is the cross-sectional design of our data. To understand the detailed causality relationship of time pressure with employee silence, flow and IWB, it should be considered that the pieces of evidence from different groups vary in the degree of time pressure at longitudinal intervals so as to make more realistic causal claims (Ployhart and Vandenberg, 2010). However, this study's results are based on multiple independent variables and interaction effects. The complex three-way estimations suggest that it is highly unlikely that such results are obtained due to a common method bias (Siemsen *et al.*, 2010).

The second issue concerns the generalisation of the results. First, our sample could be affected by a self-selection bias. Indeed, owner-managers that accepted to participate to our research were all highly sensitive to the theme of innovation management and conscious of the strategic importance of innovation. Thus, the five participating firms could not represent "average" firms. Second, we drew our sample from among Italian firms and cannot assume generalisation in the context of other economies. To broaden the applicability of our results, further research can be conducted in a cross-cultural context, including more variables such as individual routines, social activities, cultural norms and other job-related factors that may influence the proposed model. In sum, our sampling method does not allow for any generalisation of the results obtained in this study. More evidence will be needed to corroborate our speculations.

Finally, we have considered employee silence in general that negatively influences employees' IWB. There are certain types of employee silence, including acquiescent, defensive (Morrison and Milliken, 2000; Pinder and Harlos, 2001), prosocial (Van Dyne *et al.*, 2003) and political kinds (Bies, 2009), as discussed in the literature review. To enhance our understanding of the relationship between employee silence and IWB, there is a need to examine these four types of silence to determine which ones critically influence IWB and how these interact with perceived time pressure.

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